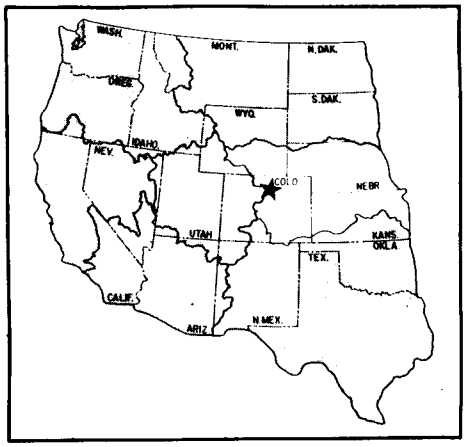
APPENDIX A

DESCRIPTION OF RECLAMATION PROJECTS

Colorado-Big Thompson Project

Colorado: Boulder, Grand, Larimer, Logan, Morgan, Sedgwick, Summit, Washington, and Weld Counties

Lower Missouri Region
Bureau of Reclamation



The Colorado-Big Thompson Project is one of the largest and most complex natural resource developments undertaken by the Bureau of Reclamation. It consists of over 100 structures integrated into a transmountain water diversion system through which multiple benefits are provided to the people.

The project spreads over approximately 250 miles in the State of Colorado. It stores, regulates, and diverts water from the Colorado River on the western slope of the Continental Divide to the eastern slope of the Rocky Mountains. It provides supplemental water for irrigation of about 720,000 acres of land, municipal and industrial use, hydroelectric power, and water-oriented recreation opportunities.

Major features of the project include dams, dikes, reservoirs, powerplants, pumping plants, pipelines, tunnels, transmission lines, substations, and other associated structures.

PLAN

The project diverts approximately 260,000 acre-feet of water annually (310,000 acre-feet maximum) from the Colorado River headwaters on the western slope to the Big Thompson River, a South Platte River tributary on the eastern slope, for distribution to project lands and communities. The Northern Colorado Water Conservancy District apportions the water used for irrigation to more than 120 ditches and 60 reservoirs. Eleven communities receive municipal and industrial water from the project. Electric power produced by six powerplants is marketed by the Western Division of the Pick-Sloan Missouri Basin Program.

The western slope collection system traps runoff from the high mountains and stores, regulates, and conveys the water to the Alva B. Adams Tunnel for diversion under the Continental Divide.

To assure irrigation and power generation under prior rights on the Colorado River, Green Mountain Reservoir was constructed on the Blue River. Spring runoff is stored in this reservoir and later released to meet the requirements of the Colorado River, and to allow diversion of water by the project throughout the year.

Irrigation systems on the Colorado River, above the Blue River confluence, were improved to enable continued use of existing rights. Releases are made from Lake Granby to maintain the Colorado River as a live fishing stream.

The principal storage features are Lake Granby and Granby Dam, located on the Colorado River near Granby. Willow Creek, a tributary below Lake Granby, is diverted by Willow Creek Dam and Canal. Willow Creek Pumping Plant lifts the water 175 feet; it then flows by gravity to Lake Granby.

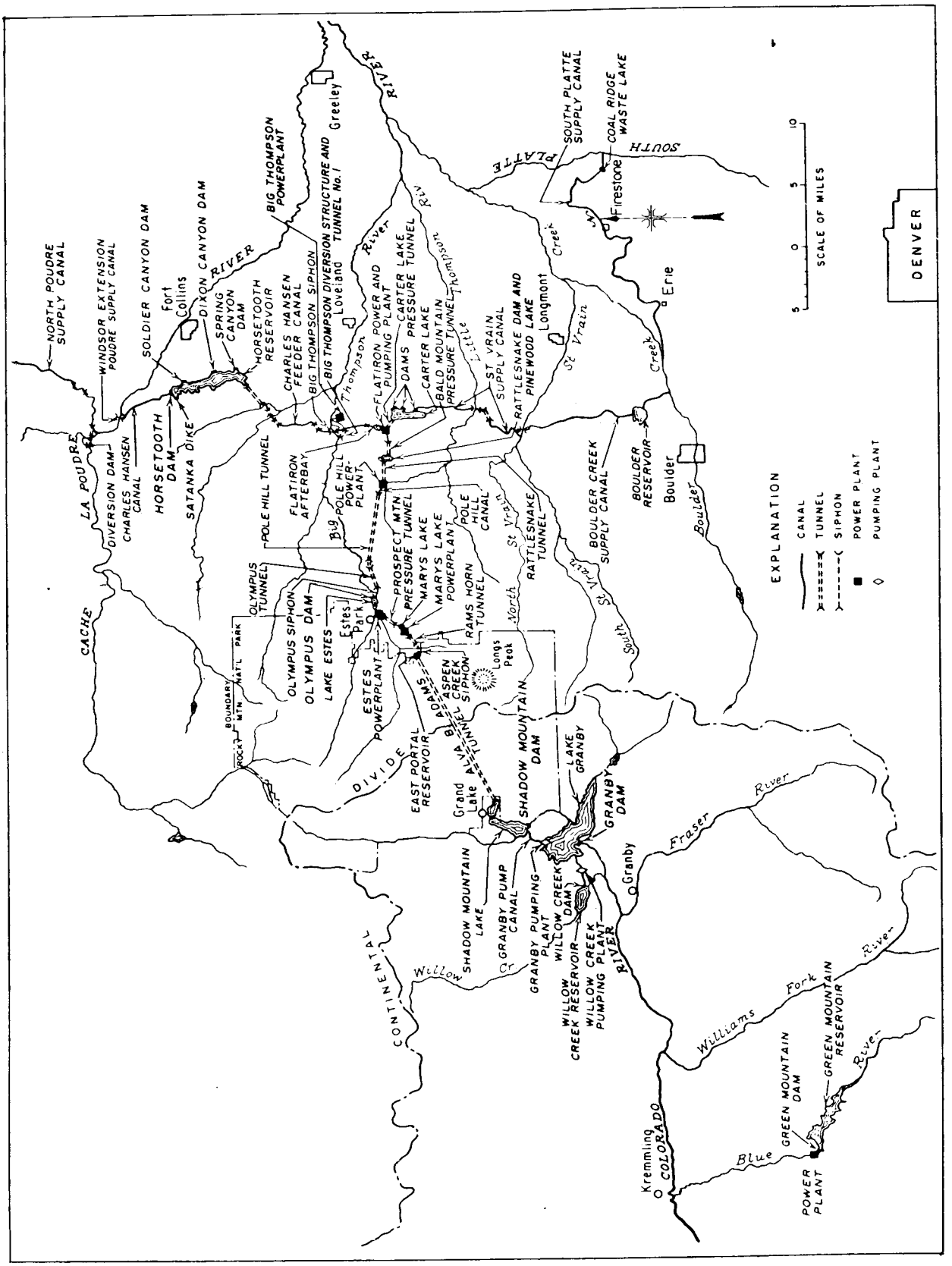
Granby Pumping Plant lifts the water 125 feet from Lake Granby to Granby Pump Canal. The canal conveys the water 1.8 miles to Shadow Mountain Lake, which also intercepts North Fork flows of the Colorado River. Shadow Mountain Lake connects with Grand Lake to make a single body of water from which diversions flow to the Alva B. Adams Tunnel to begin the journey to the eastern slope.

Emerging from Alva B. Adams Tunnel into the East Portal Reservoir, the water flows across Aspen Creek Valley in a siphon and then under Rams Horn Mountain through a tunnel. At this point, it enters a steel penstock and falls 205 feet to Marys Lake Powerplant. This powerplant is located on the west shore of Marys Lake, which provides afterbay and forebay capacity for re-regulating the flow. Between Marys Lake and Estes Powerplant, on the shore of Lake Estes, the water is conveyed by Prospect Mountain Conduit and Prospect Mountain Tunnel.

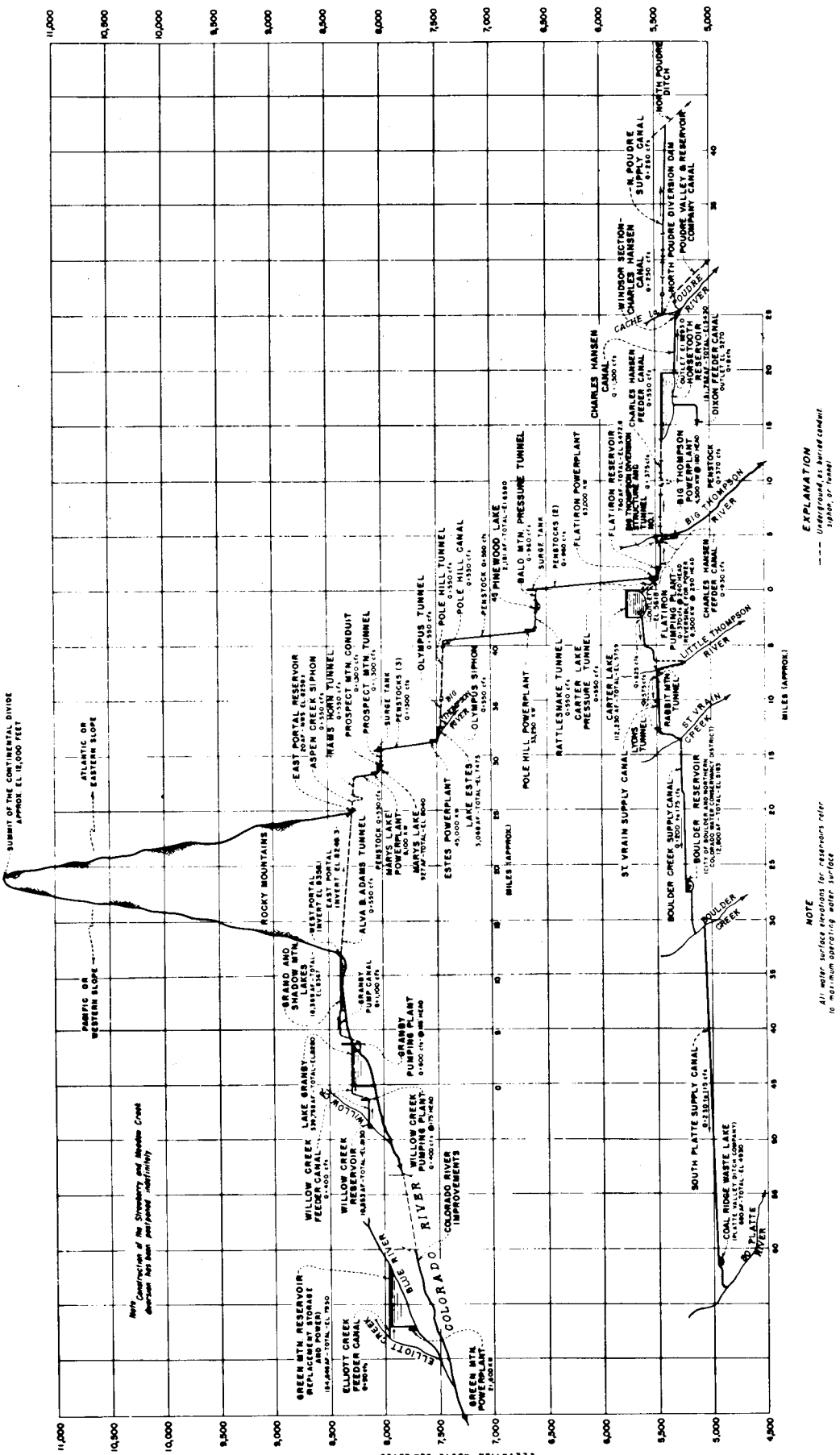
Lake Estes, below Estes Powerplant, is formed by Olympus Dam constructed across the Big Thompson River. The afterbay storage in Lake Estes and the forebay storage in Marys Lake enable the Estes Powerplant to meet daily variations in energy demand.

Water from Lake Estes and some Big Thompson River floodwaters are conveyed by Olympus Siphon and Tunnel

Region Revision 12/82



Colorado-Big Thompson Project



Colorado-Big Thompson Project, Profile

Granby Dam and Reservoir

and Pole Hill Tunnel and Canal to a penstock through which the water drops 815 feet to Pole Hill Powerplant. It is then routed through Pole Hill Powerplant Afterbay, Rattlesnake Tunnel, Pinewood Lake, and Bald Mountain Pressure Tunnel, and dropped 1,055 feet through two penstocks to Flatiron Powerplant. This powerplant discharges into Flatiron Reservoir, which regulates the water for release to the foothills storage and distribution system. The afterbay storage in Flatiron Reservoir and the forebay storage in Pinewood Lake enable Flatiron Powerplant to meet daily power loads.

Southward, the Flatiron reversible pump lifts water from Flatiron Reservoir, a maximum of 297 feet, and delivers it through Carter Lake Pressure Conduit and Tunnel to Carter Lake. When the flow is reversed, the unit acts as a turbine-generator and produces electric energy.

The St. Vrain Supply Canal delivers water from Carter Lake to the Little Thompson River, St. Vrain Creek, and Boulder Creek Supply Canal. The latter delivers water to Boulder Creek and Boulder Reservoir. The South Platte Supply Canal, diverting from Boulder Creek, delivers water to the South Platte River.

Northward, the Charles Hansen Feeder Canal transports water from Flatiron Reservoir to the Big Thompson River and Horsetooth Reservoir. The canal crosses the Big Thompson River in a siphon above the river and highway. Water from the Big Thompson River can be diverted into the canal by Tunnel No. 1, Horsetooth Supply Conduit.

Project water deliveries and Big Thompson River water to be returned to the river are dropped through a chute from the feeder canal ahead of the siphon crossing, or are passed through the Big Thompson Powerplant to convert the available head to electric energy.

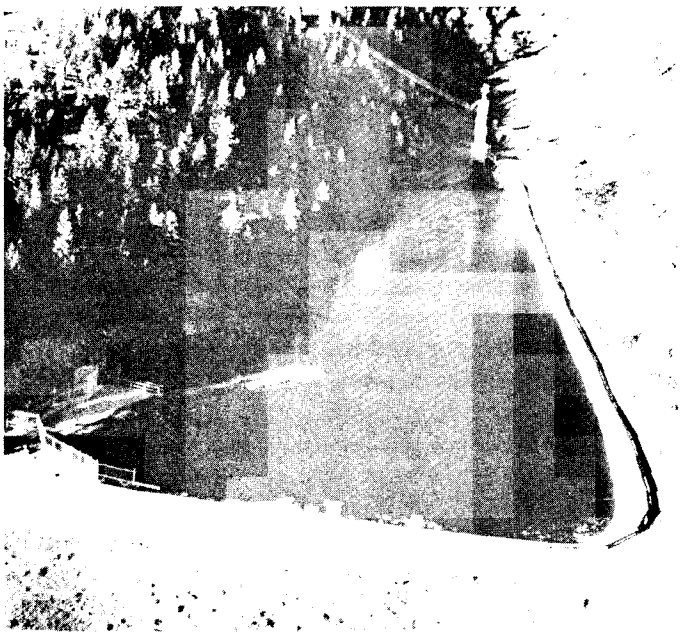
Horsetooth Reservoir is west of Fort Collins between two hogback ridges, where Horsetooth Dam closes the gap at one end. Soldier, Dixon, and Spring Canyon Dams and Satanka Dike close the remaining gaps.

An outlet at Soldier Canyon Dam supplies water to Fort Collins, rural water districts, Colorado State University, and the Dixon Feeder Canal for the irrigated area cut off from its water supply by the reservoir.

The principal outlet from Horsetooth Reservoir is through Horsetooth Dam into the Charles Hansen Canal. This canal delivers water to a chute discharging into the Cache la Poudre River and to a siphon crossing the river to supply the Poudre Valley and Reservoir Company Canal. A turnout supplies the Greeley municipal water works. Water is delivered to the river to replace, by exchange, that water diverted upstream of the North Poudre Supply Canal, which conveys it to the North Poudre Ditch.

Green Mountain Dam, Reservoir, and Powerplant

Green Mountain Dam is on the western slope 13 miles southeast of Kremmling on the Blue River, a tributary of the Colorado. This dam provides replacement storage for water diverted by the project to the eastern slope. The dam is an earthfill structure, 309 feet high, with a crest length of 1,150 feet and a volume of 4,360,211 cubic yards. The reservoir has a total capacity of 153,639 acre-feet. The powerplant has two units with a total installed generating capacity of 21,600 kilowatts.



East Portal, Alva B. Adams Tunnel

Granby Dam and Lake Granby

Granby Dam is located on the Colorado River about 5.5 miles northeast of Granby. It collects and stores most of the project water supply, including the flow of the Colorado River and water pumped from Willow Creek. The dam is constructed of compacted earthfill, 298 feet high, with a crest length of 861 feet. There are 12,722 feet of auxiliary dikes. The reservoir has a capacity of 539,800 acre-feet. Total volume of the dam is 2,974,000 cubic yards. The dikes have a total volume of 1,739,000 cubic yards.

Willow Creek Dam, Reservoir, and Pumping Plant

Willow Creek Dam is 127 feet high, 1,100 feet long, and constructed of earthfill. There are 3.4 miles of canals with a capacity of 400 cubic feet per second and a pumping plant with two 200-cubic-foot-per-second pumps that lift water 175 feet into Lake Granby. The dam diverts an average of 40,000 acre-feet of water each year from Willow Creek into Lake Granby. The reservoir capacity is 10,600 acre-feet.

Granby Pumping Plant and Pump Canal

Water is pumped from Lake Granby into Shadow Mountain Lake by Granby Pumping Plant and Canal. The pumping plant contains three centrifugal pumps with a total capacity of 600 cubic feet per second at 186-foot head. The pumping lift ranges from 85 to 186 feet according to the water surface elevation in Lake Granby. The water is discharged into a canal which has a capacity of 1,100 cubic feet per second, and conveyed 1.8 miles to Shadow Mountain Lake.

Shadow Mountain Dam and Reservoir

Shadow Mountain Dam, located on the Colorado River below its confluence with the Grand Lake outlet, is an earthfill structure 63 feet high and 3,077 feet long. The reservoir formed by the dam has a total capacity of 18,400 acre-feet and is linked to Grand Lake through a connecting channel. Shadow Mountain Lake receives the water pumped from Lake Granby and also intercepts North Fork flows of the Colorado River. Project water is released from Grand Lake directly into the Alva B. Adams Tunnel, through which it flows to the eastern slope of the Continental Divide.

Alva B. Adams Tunnel

This 9.75-foot-diameter, 13-mile-long tunnel extends from Grand Lake through the Continental Divide to a point 4.5 miles southwest of Estes Park. It has a capacity of 550 cubic feet per second.

East Slope Power System-Upper

The structures of this system convey water 4.3 miles from the east portal of Alva B. Adams Tunnel to the Big Thompson River.

Emerging from the tunnel into the East Portal Reservoir, the water flows across Aspen Creek Valley in a siphon and then under Rams Horn Mountain in a tunnel. At this point, the water enters a steel penstock and falls 205 feet to Marys Lake Powerplant, which has an installed capacity of 8,100 kilowatts. This plant is located on the west shore of Marys Lake, which has been enlarged by diking the small natural basin to provide afterbay and forebay capacity for reregulating the flow. From Marys Lake to Estes Powerplant, the water is dropped 482 feet in a pressure system consisting of Prospect Mountain Conduit and Prospect Mountain Tunnel.

Estes Powerplant contains three generating units served by three 78-inch-diameter penstocks about 0.75 mile long. The installed plant capacity is 45,000 kilowatts when operating under an average net head of 482 feet.

Olympus Dam, a zoned earthfill structure with a concrete overflow spillway, is 70 feet high and has a crest length of 1,951 feet. It impounds Lake Estes on the Big Thompson River and provides regulating capacity for energy purposes. The lake has a total capacity of about 3,100 acre-feet and controls the discharges from Estes Powerplant, river inflow and outflow, and releases of project water to the Lower East Slope Power System.

East Slope Power System-Lower

This system conveys project water from Lake Estes in a southeasterly direction to the Foothills storage and supply

system. Project water released from Lake Estes flows through Olympus Siphon and Tunnel and Pole Hill Tunnel and Canal into Pole Hill Penstock and Powerplant. Water also can be released from Lake Estes to the Big Thompson River. Leaving Pole Hill Powerplant Afterbay, the water enters Rattlesnake Tunnel and flows into Pinewood Lake formed by Rattlesnake Dam. Bald Mountain Tunnel carries the water into the Flatiron Penstocks and Powerplant which discharges into Flatiron Reservoir, where it is stored for irrigation use. Pole Hill Powerplant operates under an average net head of 815 feet with a generating capacity of 33,250 kilowatts.

The Flatiron Powerplant operates under an average net head of 1,055 feet, with a generating capacity of 71,500 kilowatts. The powerplant contains two main power units and a reversible 13,000-horsepower pump-turbine unit which lifts water southward from Flatiron Reservoir to Carter Lake. This unit is capable of discharging a maximum of 370 cubic feet per second into Carter Lake and normally operates on surplus or off-peak power generated by other power units of the project system.

The pumping unit at Flatiron Powerplant pumps from Flatiron Reservoir to Carter Lake through a 1.4-mile-long connecting pressure tunnel. The pumping lift through this tunnel ranges from 200 to 300 feet, depending on the water surface elevation in Carter Lake. During peak load demands on the project system, water can be released from Carter Lake to flow back into Flatiron Reservoir, and at such times the pump-turbine operates in reverse to generate 8,500 kilowatts of power.

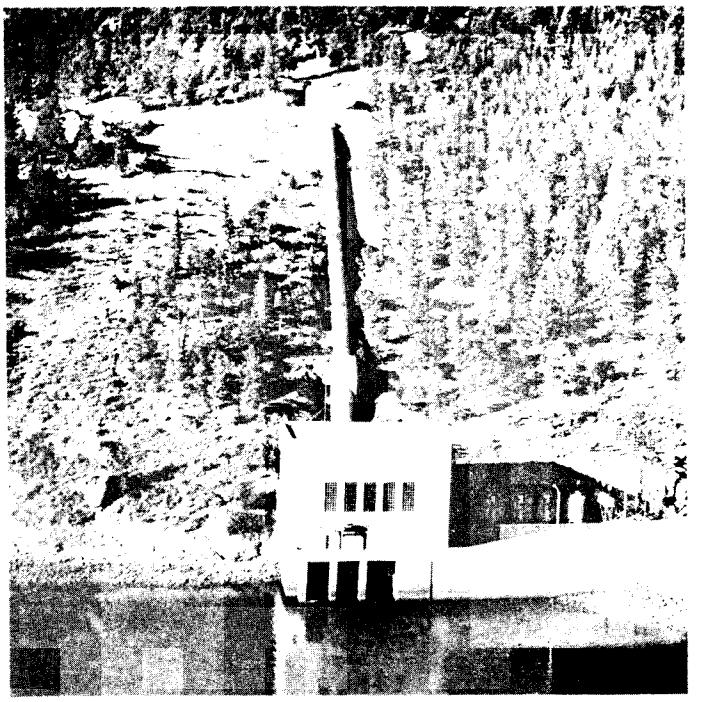
Flatiron Dam provides afterbay storage for water discharged from the powerplant. The water then flows by gravity northward through the Charles Hansen Feeder Canal, to and across the Big Thompson River, and on to Horsetooth Reservoir for delivery to the Poudre River, Poudre Valley Canal, and, by exchange, to the North Poudre Supply Canal.

Water pumped southward into Carter Lake is stored for irrigation deliveries to the Little Thompson River, St. Vrain Creek, Boulder Creek, and the South Platte River.

Carter Lake Dam and Reservoir

Carter Lake is one of the two main project storage reservoirs in the East Slope distribution system. Water is stored in this reservoir for delivery to the Little Thompson River, St. Vrain Creek, Boulder Creek, and the South Platte River, for return to Flatiron Reservoir for use in the Big Thompson or Cache la Poudre Valleys, or for power generation.

Carter Lake Reservoir is formed in a natural basin in the foothills by a 214-foot-high earthfill dam and two smaller dams across low saddles in the surrounding hills. The reservoir has a total capacity of 112,230 acre-feet.



Marys Lake Powerplant

St. Vrain Supply Canal

Leading from the Carter Lake outlet, the St. Vrain Supply Canal extends southward 9.8 miles to St. Vrain Creek near Lyons. It consists of an open canal, siphons, tunnels, drops, and flumes designed to convey 625 cubic feet per second of water to the Little Thompson River turnout and 575 cubic feet per second from the turnout to St. Vrain Creek.

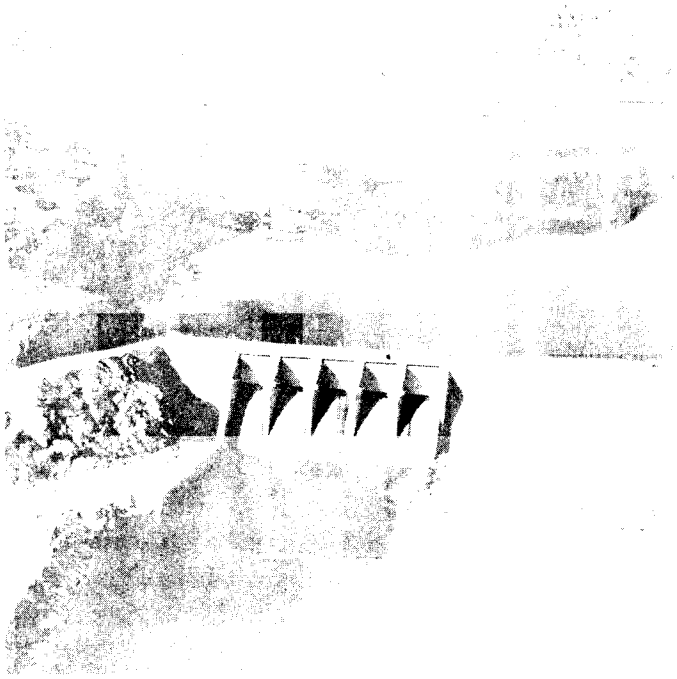
Boulder Creek Supply Canal

Boulder Creek Supply Canal begins at the turnout near the end of the St. Vrain Supply Canal, crosses St. Vrain Creek by a siphon, and extends southeasterly 15.7 miles. It discharges into Boulder Creek about 6 miles east of Boulder. The canal has a carrying capacity of 200 cubic feet per second.

Near the lower end of the canal, the city of Boulder constructed Boulder Reservoir to be used for storage and regulation of the city's water for replacement water carried in the canal. This reservoir was built under an agreement between the city and the Northern Colorado Water Conservancy District. Under the agreement, the reservoir provides 175 cubic feet per second of flow for the South Platte Supply Canal.

South Platte Supply Canal

This canal extends from Boulder Creek generally northeast to the South Platte River, a distance of about 32.2 miles. The capacity of the canal is 230 cubic feet per

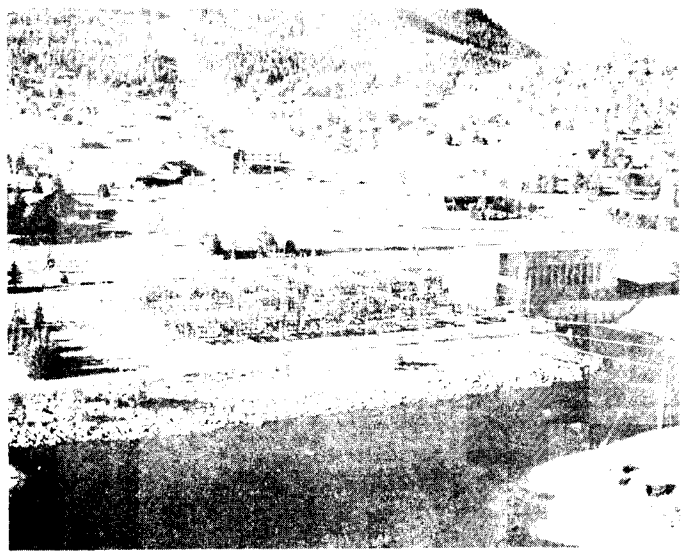


Olympus Dam

second at the start and progressively decreases. Near the lower end of the canal, the Platte Valley Irrigation Co. constructed Coal Ridge Waste Lake for storage. This reservoir was built under an agreement with the Northern Colorado Water Conservancy District. Under the agreement, the lake provides 100 cubic feet per second of South Platte Supply Canal flows.

Charles Hansen Feeder Canal

Beginning at the outlet of Flatiron Reservoir, the Charles Hansen Feeder Canal extends northward to Horsetooth Reservoir. The canal has a capacity of 930 cubic feet per second to the Big Thompson River and 550 cubic feet per second to the reservoir. The canal crosses the Big Thompson River and U.S. Highway 34 in a 9-foot-diameter steel siphon. A control structure ahead of the Big Thompson River Siphon provides a means to release irrigation water to the Big Thompson River to bypass surplus water, and to release water to the Big Thompson Powerplant. The Horsetooth Supply Conduit, an important feature of the canal, diverts water from the Big Thompson River about 1 mile upstream from the control structure and delivers it via a tunnel to the Charles Hansen Feeder Canal above the control structure. Diverted water is used for power generation at the Big Thompson Powerplant, or water surplus to the needs of the Big Thompson Valley can be stored in Horsetooth Reservoir. North of the Big Thompson River, the canal passes through four concrete-lined tunnels; the outlet of the last tunnel discharges the water into the Horsetooth Reservoir.



Estes Powerplant

Big Thompson Powerplant

The Big Thompson Powerplant is on the Big Thompson River about 9 miles west of Loveland and just downstream from the river crossing of the Charles Hansen Feeder Canal. The plant operates under an effective head of 180 feet and has a generating capacity of 4,500 kilowatts.

Horsetooth Reservoir

Horsetooth Reservoir, with a total capacity of about 151,750 acre-feet, furnishes the main supply for the Poudre Valley, where 50 percent of the project water is used. The reservoir is 6.5 miles long, and is formed by four large earthfill dams. Horsetooth Dam closes the northern end of the valley, and Soldier Canyon, Dixon Canyon, and Spring Canyon Dams close natural outlets eroded through the hogback ridge. These dams have heights of 155, 226, 240, and 220 feet, respectively. The dams contain more than 10 million cubic yards of earthfill.

Charles Hansen and North Poudre Supply Canals

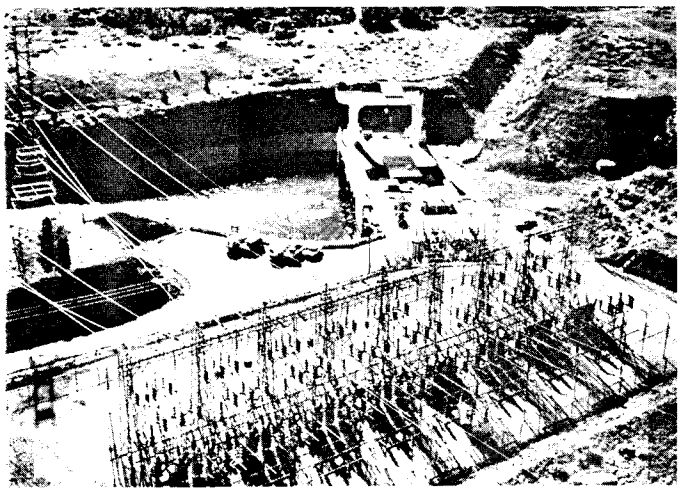
Outlets at Horsetooth Dam discharge into the Charles Hansen Canal, which is designed to carry a maximum of 1,500 cubic feet per second northward 5.1 miles to the Cache la Poudre River. Project water released into the river at this point is used to supplement the water supply of irrigation systems stemming from the river. It also serves as replenishment for the water taken from the river a few miles upstream by the North Poudre Supply Canal, a 12.5-mile-long canal which carries supplemental water to the North Poudre Ditch. The 0.5-mile, 250-cubic-foot-per-second Windsor Extension Canal takes

Pole Hill Powerplant

part of the Poudre supply across the river to the Poudre Valley Canal, an older waterway that serves a portion of the conservancy district.

The Soldier Canyon Dam outlet supplies water to Colorado State University, to the small Dixon Feeder Canal for the irrigated area cut off from its water supply by Horsetooth Reservoir, to Fort Collins, and to rural water districts.

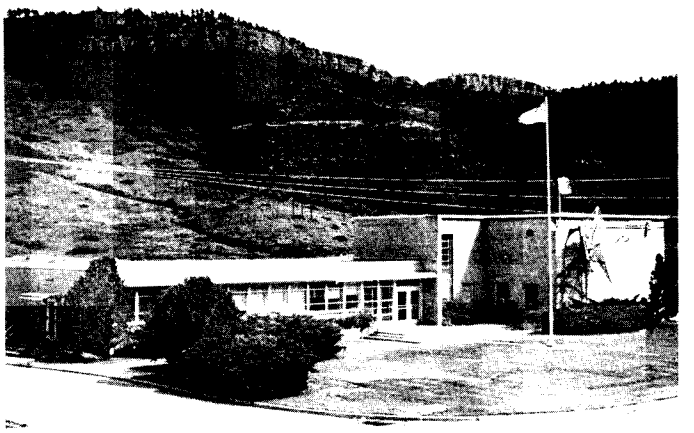
The Cache la Poudre, Big Thompson, and Little Thompson Rivers, and St. Vrain and Boulder Creeks are tributaries of the South Platte River, through which water imported from the western slope is supplied to the South Platte River Basin system. This supplemental water is used to alleviate the critical shortages that have hampered and restricted the cultivation of fertile lands in the South Platte River Valley.



Flatiron Powerplant

Power Distribution System

Power transmission facilities include nearly 677 miles of transmission lines, 35 permanent substations, 2 mobile substations, 1 mobile transformer, 22 metering stations, and 6 permanent service shops. With the exception of 3 miles of steel tower construction of 13.1 miles of submarine-type conduit, the transmission circuits are of wood pole H-frame construction. The submarine-type conduit is the connection between eastern and western slope circuits and is in a nitrogen gas-filled pipe suspended from the top of the Alva B. Adams Tunnel. Project power facilities are interconnected with plants of the North Platte, Kendrick, Riverton, and Shoshone Projects, and are tied into the lines of the Public Service Company of Colorado at five different locations in Colorado. Most of these power features were transferred to the Department of Energy's (DOE) Western Area Power Administration upon the creation of DOE in 1977.



Flatiron Dispatching Office

DEVELOPMENT

Early History

In 1870, before statehood was achieved by the Colorado Territory, the Union Colony of 2,000 people was established at Greeley. This marked the inception of cooperative irrigation in the South Platte River Valley and the beginning of an era in which irrigation became important in the economic development of northeastern Colorado.

The Union Colony started with construction of ditches to supply direct flow from the river to 12,000 acres. The venture was so successful that by 1900 the streams were overappropriated and attention was given to development of plains reservoirs to store the spring floods. By 1910, most of the better reservoir sites were used and few other possibilities were apparent, except costly transmountain diversion.

During these years, the increasing demand for agricultural products for a growing population, and the tendency to prepare as large an irrigation system as possible

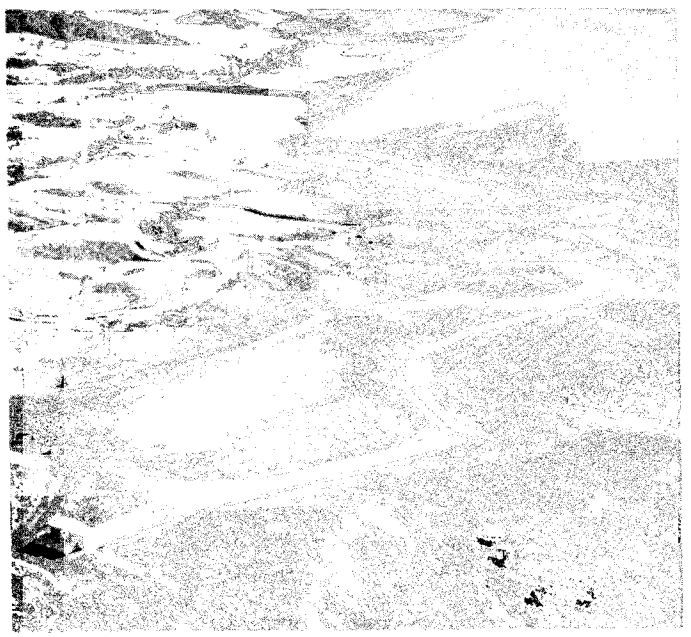
Flatiron Dam and Reservoir

Pinewood Lake and Rattlesnake Dam

to spread the cost of the works, resulted in over-expansion, especially in years of high and adequate runoff. Subnormal or even normal runoff years were critical for much of the area so developed. Water shortages continually plagued the irrigators.

Investigations

The idea of transmountain water diversions had been in existence since 1889, when the Colorado legislature appropriated money to investigate such a proposal. Progressive steps in legislation finally led, in 1922, to the signing of the Colorado River Compact, which apportioned the Colorado River water between the upper and lower basin States. Later, the Boulder Canyon Act provided funds for determining the amount of lands that were or could be irrigated in the Colorado River Basin. A plan was developed whereby Colorado River water could be diverted into watersheds in northeastern Colorado where there was a surplus of irrigable lands and a shortage of water. The upper basin States successfully developed a compact in 1948 prorating the upper basin's share based on the 1922 compact.



Flatiron Penstocks

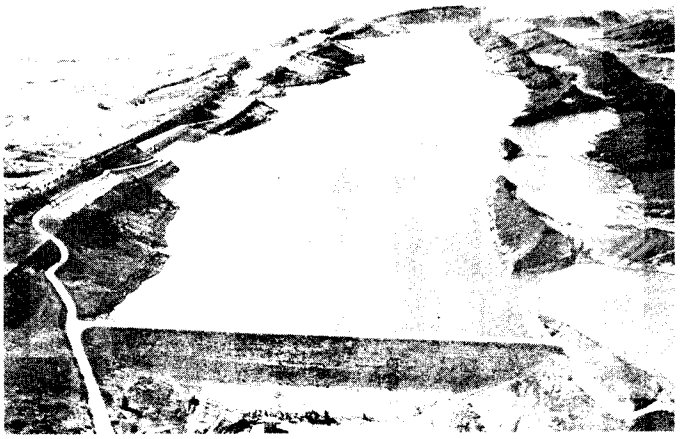
Engineering investigations of the Colorado-Big Thompson Project began in 1933, when a preliminary survey to determine the feasibility of a project was undertaken. A favorable report was presented in 1934. In January 1935, the Bureau of Reclamation was allotted funds by the Public Works Administration to make a new study.

Project construction was contingent upon the formation of a conservancy district to contract with the United States Government. Accordingly, the Colorado Water Conservancy Law was passed by the Colorado legislature in 1937. The law contains several unique features. One provides that a conservancy district may be organized by any district court upon petition of a stipulated number of property owners; another recognizes that all who benefit as a result of project development should contribute to its cost and operation in proportion to those benefits.

The Northern Colorado Water Conservancy District was organized in 1937 with boundaries which include large areas of Larimer, Boulder, and Weld Counties, and portions of Morgan, Washington, Logan, and Sedgwick Counties.

Authorization

First construction funds were provided in the Interior Department Appropriation Act of August 9, 1937 (50 Stat. 595). The Secretary's finding of feasibility was approved by the President on December 21, 1937.



Horsetooth Dam and Reservoir

Construction

Construction of the project began at Green Mountain Dam during November 1938. The first power was generated at the Green Mountain Powerplant in May 1943; all construction of the dam and powerplant was completed in October 1943. Construction of Granby Dam started in 1941, and of Alva B. Adams Tunnel in the summer of 1940. Work was curtailed during World War II, but not entirely stopped. At the end of the war, the tempo of construction was speeded up. During 1956, all major features were essentially completed except the Big Thompson Powerplant, which was completed in 1959.

Operating Agencies

The Bureau of Reclamation operates all project features on the western slope, including power, storage, and carriage, and all similar works on the eastern slope above the supply canals leading from Carter Lake and Horsetooth Reservoirs. All project works below these two reservoirs are operated and maintained by the Northern Colorado Water Conservancy District.

BENEFITS

Irrigation

The Colorado-Big Thompson Project helps stabilize the agricultural and industrial economy of northeastern Colorado. It is particularly effective each year during late summer months of the irrigation season, and has a tremendous impact throughout the season in drought years.

Principal crops include sugar beets, potatoes, beans, corn, small grains, fruits, alfalfa, vegetables, dairy products, poultry, and eggs. In addition, lambs, hogs, and cattle are fattened from the byproducts of the sugar beets.

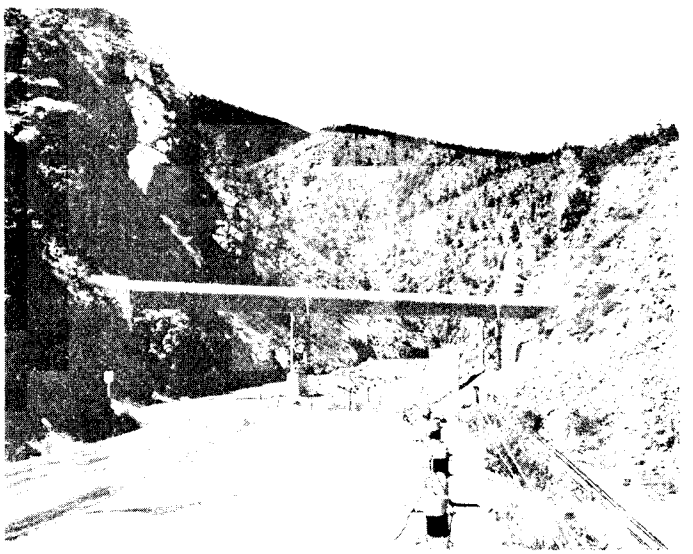
Municipal and Industrial Water

Municipal supplies have been an important aspect in the distribution of project water. Originally, nine communities had allotments totaling 44,950 acre-feet. Eleven communities now receive full or supplemental supplies. Each year, as urban population increases, irrigation allotments are transferred to domestic purposes. The dependable availability of water continues to attract a variety of industries.

Hydroelectric Power

From the eastern portal of the Alva B. Adams Tunnel, water descends about 2,800 feet to the foothills. Nearly every foot of the head is used for hydroelectric power generation. Gross generation averages 760 million kilowatt-hours, of which 70 million kilowatt-hours are used by project pumps and 690 million kilowatt-hours are marketed to customers in northern Colorado, eastern Wyoming, and western Nebraska. The power produced at the Bureau powerplants is marketed by DOE.

The water and power control center for Reclamation's reservoirs, powerplants, and transmission lines in Wyoming, Colorado, and western Nebraska is at the project headquarters in Loveland, Colo. This Western Division of the Missouri River Basin is an interconnected system of 15 Reclamation powerplants and 391,750 kilowatts of installed capacity.



Big Thompson Siphon

Recreation

About two million people visit the manmade lakes annually to enjoy fishing, motor- and sailboating, water skiing, swimming, camping, hiking, and picnicking. Trout, kokanee, bass, walleye, and perch are the principal fish caught in the clear, cool waters. Ice fishing and snowmobiling have become favorite winter sports.

PROJECT DATA

Land Areas (1981)

Irrigable area:		
Supplemental irrigation service	720,000	acres
Number of irrigated farms	2,650	

Area Irrigated and Crop Value

Year	Area irrigated, acres	Crop value, dollars
1968	720,000	98,712,837
1969	720,000	96,422,132
1970	720,000	102,472,357
1971	720,000	117,977,554
1972	676,274	140,890,357
1973	661,418	169,123,755
1974	658,720	269,312,087
1975	658,720	280,483,739
1976	658,720	225,890,031
1977	645,058	236,163,983
1978	638,272	233,345,481
1979	636,960	254,712,797
1980	634,808	246,468,934
1981	633,460	288,240,869

Facilities in Operation

Storage dams	14	
Diversion dams	7	
Canals	99.1	mi
Tunnels	34.12	mi
Pumping plants	3	
Powerplants	6	
Transmission lines	3.42	mi
Substations	5	

Climatic Conditions

Annual precipitation	15	in
Temperature:		
Maximum	102	°F
Minimum	−41	°F
Mean	48	°F
Growing season	120-150	days
Elevation of irrigable area	3500-5400.0	ft

Settlement

Number of persons served with project water (1981):	
Farm irrigation service	10,600
Municipal and other water service[1]	398,998
Total	409,598

[1]Urban and suburban, residential, commercial, municipal and industrial lands.

Power Generation

Fiscal Year	Big Thompson Powerplant, kWh	Estes Powerplant, kWh	Flatiron Powerplant, kWh	Green Mountain Powerplant, kWh	Marys Lake Powerplant, kWh	Pole Hill Powerplant, kWh	Total kWh
1949				65,690,800			65,690,800
1950				79,813,200			79,813,200
1951		16,549,000		72,688,800	1,710,000		90,947,800
1952		19,139,700		96,205,300	7,574,000		122,919,000
1953		55,350,300		82,979,200	21,480,500		159,810,000
1954		130,229,700	126,585,800	56,694,300	49,197,100	103,692,000	466,398,900
1955		134,749,600	284,038,000	36,533,000	49,471,300	221,097,000	725,888,900
1956		102,732,200	252,454,000	71,189,400	39,196,800	196,763,000	662,335,400
1957		100,749,000	253,612,000	66,937,600	38,646,800	197,108,000	657,053,400
1958		70,499,000	222,570,000	97,011,700	27,233,200	172,014,000	589,327,900
1959	5,130,500	126,231,000	288,537,000	58,063,500	48,315,000	224,145,000	750,422,000
1960	13,461,500	112,037,500	270,083,000	68,960,000	42,977,000	211,642,000	719,161,000
1961	13,717,000	112,005,000	271,096,000	52,600,500	42,958,000	215,040,000	707,416,500
1962	15,565,000	74,357,000	197,485,000	79,331,200	28,239,000	154,036,000	549,013,200
1963	14,936,000	138,569,500	300,514,000	52,034,500	52,680,000	236,396,000	795,130,000
1964	13,649,000	138,840,000	301,771,000	21,224,500	53,102,000	242,128,000	770,714,500
1965	13,111,000	121,427,000	283,723,000	32,636,000	46,670,000	225,394,000	711,961,000
1966	11,029,000	82,472,000	215,394,000	57,988,500	32,166,000	169,170,000	568,219,500
1967	12,734,000	135,633,000	300,883,000	40,568,000	52,503,000	237,700,000	780,021,000
1968	12,897,000	91,005,000	218,123,000	42,528,000	34,328,000	173,028,000	571,909,000
1969	13,194,000	78,474,000	205,442,000	52,454,000	29,477,000	163,394,000	542,435,000
1970	15,785,000	98,289,000	252,113,000	83,789,000	37,184,000	199,100,000	686,260,000
1971	16,781,000	74,210,000	204,011,000	72,916,000	28,072,000	162,744,000	558,734,000
1972	15,355,000	116,250,000	263,196,000	72,349,000	45,037,000	207,820,000	720,007,000
1973	16,091,000	103,415,000	246,628,000	56,932,000	38,564,000	195,354,000	656,984,000
1974	16,312,000	92,585,000	216,412,000	78,748,000	33,704,000	170,070,000	607,831,000
1975	15,648,000	123,971,000	282,426,000	52,639,000	46,415,000	224,676,000	745,775,000
1976	16,398,000	107,031,000	263,968,000	58,815,000	41,365,000	208,374,000	695,951,000
1977	12,110,000	135,555,000	300,473,000	41,295,000	52,241,000	241,960,000	783,634,000
1978	14,183,000	121,103,000	298,172,000	28,071,000	45,559,000	241,662,000	748,750,000
1979	12,205,000	88,268,000	251,341,000	49,644,000	30,065,000	199,686,000	631,209,000
1980	15,338,000	67,080,000	199,983,000	66,888,000	22,597,000	148,188,000	520,074,000
1981	12,558,000	115,252,000	251,286,000	28,747,000	44,457,000	204,806,000	657,106,000

ENGINEERING DATA

Water Supply

Colorado River

Drainage area above Shadow Mountain Dam	187	mi²
Annual discharge at Shadow Mountain Lake:		
Maximum (1978)	310,000	acre-ft
Minimum (1934)	63,000	acre-ft
Average	139,800	acre-ft
Drainage area between Granby Dam and Shadow Mountain Dam	124	mi²
Annual discharge at Lake Granby:		
Maximum (1957)	369,400	acre-ft
Minimum (1954)	132,000	acre-ft
Average	230,300	acre-ft

Willow Creek

Drainage area above Willow Creek Dam	127	mi²
Annual discharge at Willow Creek Reservoir:		
Maximum (1962)	102,000	acre-ft
Minimum (1981)	23,600	acre-ft
Average	55,000	acre-ft
Estimated average annual diversions (all sources)	257,700	acre-ft

Blue River

Drainage area above Green Mountain Dam	599	mi²
Annual discharge at Green Mountain Reservoir:		
Maximum (1957)	517,900	acre-ft
Minimum (1964)	171,900	acre-ft
Average	345,100	acre-ft

Storage Facilities

Green Mountain Dam

Type: Zoned earthfill
Location: On the Blue River, 13 mi southeast of Kremmling, Colo.
Construction period: 1938-43
Date of closure (first storage): November 16, 1942

Reservoir, Green Mountain:		
Average annual inflow, 1937-76	345,100	acre-ft
Total capacity to El. 7950	153,639	acre-ft
Active capacity, El. 7870-7950	112,849	acre-ft
Surface area	2,130	acres
Dimensions:		
Structural height	309	ft
Hydraulic height	264	ft
Top width	40	ft
Maximum base width	1,688	ft
Crest length	1,150	ft
Crest elevation	7960.0	ft
Total volume	4,360,211	yd³

Spillway: Concrete-lined open channel in left abutment controlled by three 25- by 22-ft radial gates.

Elevation top of gates	7950.0	ft
Crest elevation	7928.0	ft
Capacity at El. 7950	25,000	ft³/s

Outlet works: Concrete-lined tunnel through right abutment enclosing two 8.5-ft-diameter steel penstocks leading to powerhouse. An outlet pipe branches from each penstock near the downstream end. Each outlet is controlled by a 44-inch needle valve.

Capacity at El. 7950	1,530	ft³/s

Foundation: Thin-bedded limey shale overlying moderately hard and firm trachyte porphyry sill. Joints, slips, and faults are combined with a high water table on both abutments.
Special treatment: Cement grout curtain beneath five cutoff walls, supplemental grouting of abutments; exposed shale painted with asphalt emulsion.

Granby Dam and Dikes

Type: Zoned earthfill
Location: On the Colorado River, 8 mi northeast of Granby, Colo. Dikes No. 1, 2, and 4 are continuous and close low areas west of Granby Dam. No. 3 closes a saddle about 1 mi southeast of Granby Dam.
Construction period: 1941-50
Date of closure (first storage): September 14, 1949

Reservoir, Lake Granby:		
Average annual inflow, 1937-76	230,300	acre-ft
Total capacity to El. 8280	539,800	acre-ft
Active capacity, El. 8186.9-8280	465,568	acre-ft
Surface area	7,260	acres

Dimensions:	*Dam*	*Dikes No. 1, 2, and 4*	*Dike No. 3*
Structural height	298 ft	20-98 ft	60 ft
Hydraulic height	231 ft	Offstream	Offstream
Top width	40 ft	30 ft	30 ft
Maximum base width	1,515 ft	120-400 ft	649 ft
Crest length	861 ft	4,430 ft	8,292 ft
Total volume	2,974,000 yd³	995,000 yd³	744,000 yd³

Spillway: Concrete-lined open channel at left abutment controlled by two 21- by 20-ft radial gates.

Elevation top of gates	8280.0	ft
Crest elevation	8260.0	ft
Capacity at El. 8280	11,500	ft³/s

Outlet works: Concrete-lined tunnel through left abutment controlled by one 12-in needle valve and one 30-in hollow-jet valve.

Capacity at El. 8280	435	ft³/s

Foundation: Granite, schist, and gneiss bedrock with many minor faults.
Special treatment: Cutoff trench and two concrete cutoff walls.

Willow Creek Dam

Type: Zoned earthfill
Location: On Willow Creek, 4 mi north of Granby, Colo.
Construction period: 1951-53
Date of closure (first storage): April 2, 1953

Reservoir, Willow Creek:		
Average annual inflow, 1937-76	55,000	acre-ft
Total capacity to El. 8130	10,600	acre-ft
Active capacity, El. 8077-8130	9,100	acre-ft
Surface area	303	acres
Dimensions:		
Structural height	127	ft
Hydraulic height	95	ft
Top width	30	ft
Maximum base width	715	ft
Crest length	1,100	ft
Crest elevation	8140.0	ft
Total volume	392,000	yd³

Spillway: Uncontrolled concrete-lined overflow weir and chute at left abutment.

Crest length	335.3	ft
Crest elevation	8130.0	ft
Capacity at El. 8132	3,200	ft³/s

Outlet works:
Diversion: Willow Creek Feeder Canal headworks at left abutment, controlled by two 8- by 7-ft radial gates.
Capacity (maximum) ..... 400 ft³/s
Outlet: Concrete-lined tunnel through right abutment, controlled by two 3- by 6.5-ft high-pressure slide gates.
Capacity at El. 8132 ..... 2,050 ft³/s
Foundation: Fine-grained siltstones with a series of lava flows.
Special treatment: Cutoff trench and concrete cutoff wall.

Shadow Mountain Dam and Dikes

Type: Zoned earthfill
Location: On Colorado River below its confluence with the Grand Lake outlet. Series of low dikes extend from right abutment of dam.
Construction period: 1944-46
Date of closure (first storage): 1946
Reservoir, Shadow Mountain and Grand Lake:

Average annual inflow, 1920-47	139,800	acre-ft
Total capacity to El. 8367	18,400	acre-ft
Active capacity, El. 8366-8367[2]	1,839	acre-ft
Surface area	1,852	acres
Dimensions:		
Structural height	63	ft
Hydraulic height	37	ft
Top width	30	ft
Maximum base width	430	ft
Crest length (including dikes)	3,077	ft
Crest elevation	8375.0	ft
Total volume (including dikes)	167,000	yd³

Spillway: Concrete-lined open channel at right abutment, controlled by two 18- by 20-ft radial gates.

Elevation top of gates	8367.0	ft
Crest elevation	8348.0	ft
Capacity at El. 8367	10,000	ft³/s

Outlet works: Sluicing outlet only below spillway floor, controlled by 2.5-ft-square slide gate at inlet end.
Capacity (maximum) ..... 50 ft³/s

Marys Lake Dikes

Type: Homogeneous earthfill
Location: Two dikes on shoreline of Marys Lake 2 mi from Estes Park, Colo.
Construction period: 1947-49
Date of closure (first storage): August 1950
Reservoir, Marys Lake:

Total capacity to El. 8040	900	acre-ft
Active capacity, El. 8025-8040	547	acre-ft
Surface area	42	acres

Dimensions:	*Dike No. 1*	*Dike No. 2*
Structural height	29 ft	35 ft
Hydraulic height	20 ft	25 ft
Top width	30 ft	30 ft
Maximum base width	170 ft	185 ft
Crest length	820 ft	950 ft
Crest elevation	8050.0 ft	8050.0 ft
Total volume (both dikes)	90,000 yd³	

Spillway: None
Outlet works: Concrete intake structure to Prospect Mountain Conduit through base of Dike No. 1, controlled by one 12.5-ft-square fixed-wheel gate.
Capacity (controlled by capacity of conduit) .. 1,300 ft³/s

[2]One-foot operating range in accordance with Senate Document No. 80.

Olympus Dam

Type: Zoned earthfill, concrete overflow section
Location: On the Big Thompson River, 1.5 miles east of Estes Park, Colo.
Construction period: 1947-49
Date of closure (first storage): November 1948
Reservoir, Lake Estes:

Average annual inflow, 1937-76	90,300	acre-ft
Total capacity to El. 7475	3,068	acre-ft
Active capacity, El. 7450.25-7475	2,659	acre-ft
Surface area	185	acres
Dimensions:		
Structural height	70	ft
Hydraulic height	45	ft
Top width	30	ft
Maximum base width	288	ft
Crest length	1,951	ft
Crest elevation	7481.0	ft
Total volume	311,600	yd³

Spillway: Concrete overflow section at south abutment, controlled by five 20- by 17-ft radial gates.

Elevation top of gates	7475.0	ft
Crest elevation	7460.0	ft
Capacity at El. 7475	22,500	ft³/s

Outlet works:
Outlet: Two 18-in pipes through gravity section, each controlled by a 2.5-ft-square slide gate.
Diversion: Intake to Olympus Siphon at right of overflow section controlled by two 6.25- by 8.0-ft fixed-wheel gates.
Capacity (controlled by capacity of siphon) ... 550 ft³/s
Foundation: Sand, gravel, and cobbles up to 15 ft deep lying over decomposed, fractured and broken granite.
Special treatment: Grout curtain beneath concrete section.

Rattlesnake Dam

Type: Zoned earthfill
Location: On Rattlesnake Creek, 12 mi east of Estes Park, Colo.
Construction period: 1951-52
Date of closure (first storage): January 4, 1954
Reservoir, Pinewood:

Total capacity to El. 6580	2,181	acre-ft
Active capacity, El. 6550-6580	1,570	acre-ft
Surface area	97	acres
Dimensions:		
Structural height	130	ft
Hydraulic height	100	ft
Top width	30	ft
Maximum base width	615	ft
Crest length	1,100	ft
Crest elevation	6595.0	ft
Total volume	432,000	yd³

Spillway: Uncontrolled concrete weir and concrete-lined chute at right abutment.

Crest length	102	ft
Crest elevation	6580.0	ft
Capacity at El. 6589	10,400	ft³/s

Outlet works:
River outlet: Cement-lined, cast-iron pipe through base of dam controlled by one 16-in gate valve.
Capacity at El. 6589 ..... 23 ft³/s
Diversion outlet: Intake to Bald Mountain Pressure Tunnel.
Foundation: Generally soft, jointed, decomposed or broken schist lying over gneiss.
Special treatment: Grout curtain beneath cutoff wall.

Flatiron Dam

Type: Zoned earthfill
Location: On Chimney Hollow Creek 8 mi southwest of Loveland, Colo.
Construction period: 1951-53
Date of closure (first storage): January 1954
Reservoir, Flatiron:

Total capacity to El. 5472.8	760	acre-ft
Active capacity, El. 5462-5472.8	436	acre-ft
Surface area	47	acres
Dimensions:		
Structural height	86	ft
Hydraulic height	55	ft
Top width	30	ft
Maximum base width	455	ft
Crest length	1,725	ft
Crest elevation	5486.0	ft
Total volume	382,000	yd^3

Spillway: Uncontrolled concrete crest and concrete-lined channel at left abutment.

Crest elevation	5472.8	ft
Capacity at El. 5480	23,600	ft^3/s

Outlet works: Twin-barrel concrete conduit through base of dam near left abutment controlled by two 6.75- by 9.0-ft radial gates.

Capacity at El. 5464.8	930	ft^3/s

Carter Lake Dams

Type: Zoned earthfill
Location: Carter Lake No. 1, the southernmost dam, is at a natural outlet from Carter Lake Basin, 7 mi northwest of Berthoud, Colo. Carter Lake No. 2 is in a saddle on east shoreline of the reservoir. No. 3 is in a saddle on the north shoreline.
Construction period: 1950-52
Reservoir, Carter Lake:

Total capacity to El. 5759	112,230	acre-ft
Active capacity, El. 5618-5759	101,022	acre-ft
Surface area	1,140	

Dimensions:	*No. 1*	*No. 2*	*No. 3*
Structural height	214 ft	75 ft	55 ft
Hydraulic height	190 ft	Offstream	Offstream
Top width	40 ft	30 ft	30 ft
Maximum base width	1,320 ft	368 ft	270 ft
Crest length	1,235 ft	1,500 ft	1,425 ft
Crest elevation	5769.0 ft	5769.0 ft	5769.0 ft
Total volume	2,547,388 yd^3	321,174 yd^3	211,852 yd^3

Spillway: None
Outlet works: Concrete conduit through base of Dam. No. 1, controlled by two 3-ft-square slide gates.

Capacity at El. 5763	1,260	ft^3/s

Foundation: Sandstones, limestones, siltstones, and shales in alternating layers, generally broken and fractured.
Special treatment: Foundations grouted.

Horsetooth Dam and Satanka Dike

Type: Zoned earthfill
Location: North end of Horsetooth Reservoir,
4 mi northwest of Fort Collins, Colo. Satanka Dike closes saddle on north shoreline, about 800 ft northwest of the dam.
Construction period: 1940-49
Date of closure (first storage): January 10, 1951
Reservoir, Horsetooth:

Total capacity to El. 5430	151,750	acre-ft
Active capacity, El. 5270-5430	143,480	acre-ft
Surface area	1,899	acres

Dimensions:	*Dam*	*Dike*
Structural height	155 ft	30 ft
Hydraulic height	Offstream	Offstream
Top width	35 ft	25 ft
Maximum base width	785 ft	120 ft
Crest length	1,840 ft	348 ft
Crest elevation	5440.0 ft	5440.0 ft

Total volume (dam and dike)	1,871,363	yd^3

Spillway: None
Outlet works: Concrete conduit through base of dam, controlled by two 72-in hollow-jet valves.

Capacity at El. 5430	2,500	ft^3/s

Foundation: Limey shales and sandstones overlain with silty, sandy clay.
Special treatment: Cutoff trench and concrete cutoff wall.

Soldier Canyon Dam

Type: Zoned earthfill
Location: East shore of Horsetooth Reservoir, 3.5 mi west of Fort Collins, Colo.
Construction period: 1946-49
Dimensions:

Structural height	226	ft
Hydraulic height	203	ft
Top width	40	ft
Maximum base width	1,365	ft
Crest length	1,438	ft
Crest elevation	5440.0	ft
Total volume	3,211,621	yd^3

Spillway: None
Outlet works: Concrete-lined, tunnel through right abutment housing 30-in steel pipe, controlled by one 18-in pivot (butterfly) valve.

Capacity at El. 5430	90	ft^3/s

Foundation: Sandstone and shale
Special treatment: Cutoff trench and concrete cutoff wall.

Dixon Canyon Dam

Type: Zoned earthfill
Location: East shore of Horsetooth Reservoir, 3 mi southeast of Fort Collins, Colo.
Construction period: 1946-49
Dimensions:

Structural height	240	ft
Hydraulic height	215	ft
Top width	40	ft
Maximum base width	1,500	ft
Crest length	1,265	ft
Crest elevation	5440.0	ft
Total volume	2,961,350	yd^3

Spillway: None
Outlet works: None
Foundation: Sandstone and shale
Special treatment: Cutoff trench and concrete cutoff wall.

Spring Canyon Dam

Type: Zoned earthfill
Location: East shore of Horsetooth Reservoir, 4.5 mi southwest of Fort Collins, Colo.
Construction period: 1940-49
Dimensions:

Structural height	220	ft
Hydraulic height	198	ft
Top width	40	ft
Maximum base width	1,350	ft
Crest length	1,120	ft

Crest elevation	5440.0 ft
Total volume	2,095,240 yd³
Spillway: None	
Outlet works: None	
Foundation: Sandstone and shale	
Special treatment: Cutoff trench and concrete cutoff wall.	

Diversion Facilities

Willow Creek Forebay Dam

Type: Earth and rockfill	
Location: On Willow Creek Feeder Canal, 1 mi west of Granby Reservoir.	
Year completed: 1953	
Dimensions:	
Structural height	24 ft
Hydraulic height	11 ft
Crest length	580 ft
Crest elevation	8120.0 ft
Total volume	15,000 yd³
Spillway:	
Capacity	450 ft³/s
Diversion outlet: Forebay connects to pumping plants through 1,500-ft-long channel.	
Capacity	400 ft³/s

East Portal Dam

Type: Rockfill with concrete corewall	
Location: On the Wind River at East Portal of Alva B. Adams Tunnel, 4.5 mi southwest of Estes Park, Colo.	
Year completed: 1947	
Dimensions:	
Structural height	76 ft
Hydraulic height	10 ft
Crest length	245 ft
Crest elevation	8265.0 ft
Spillway:	
Capacity	550 ft³/s
Crest elevation	8258.3 ft
Diversion outlet: To Parshall flume section ahead of Aspen Creek Siphon.	
Capacity	550 ft³/s

Little Hell Creek Diversion Dam

Type: Earth and rockfill	
Location: On Little Hell Creek above Pole Hill switchyard.	
Year completed: 1952	
Dimensions:	
Structural height	43 ft
Hydraulic height	33 ft
Crest length	220 ft
Crest elevation	6640.0 ft
Volume	10,000 yd³
Spillway: None	
Diversion capacity	550 ft³/s

South Platte Supply Canal Diversion Dam

Type: Diversion embankment and concrete overflow structure connected by 885-ft channel	
Location: On Boulder Creek about 8 mi east of Boulder, Colo.	
Year completed: 1956	
Dimensions:	
Structural height (embankment)	10.6 ft
Hydraulic height (embankment)	5 ft
Crest length (embankment)	64 ft
Crest length (concrete section)	34 ft
Crest elevation (embankment)	5052.2 ft
Spillway: Concrete overflow type	
Capacity	230 ft³/s

Pole Hill Afterbay Dam

Type: Earth and rockfill	
Location: Below Pole Hill Powerplant, 10.5 mi east of Estes Park, Colo.	
Year completed: 1953	
Dimensions:	
Structural height	32 ft
Hydraulic height	21 ft
Crest length	220 ft
Crest elevation	6597.0 ft
Volume	6,000 yd³
Siphon spillway:	
Capacity	550 ft³/s
Crest elevation	6593.0 ft
Diversion capacity	550 ft³/s

Big Thompson Diversion Dam

Type: Concrete box, combined overflow and grated inlet	
Location: On the Big Thompson River, at west portal of Horsetooth Supply Conduit, 8.5 mi west of Loveland, Colo.	
Year completed: 1950	
Dimensions:	
Structural height	35 ft
Hydraulic height	8 ft
Crest length	90 ft
Crest elevation	5500.0 ft
Weir crest length	50 ft
Weir crest elevation	5486.5 ft
Volume	1,300 yd³
Spillway: Overflow	
Diversion capacity	600 ft³/s

North Poudre Diversion Dam

Type: Concrete ogee weir	
Location: On the Cache la Poudre River about 11 mi northwest of Fort Collins, Colo.	
Year completed: 1952	
Dimensions:	
Structural height	24 ft
Hydraulic height	6 ft
Crest length	200 ft
Crest elevation	5439.0 ft
Weir crest length	130 ft
Weir crest elevation	5428.0 ft
Volume	1,300 yd³
Spillway: Overflow	
Diversion capacity	250 ft³/s

Carriage Facilities

Elliot Creek Feeder Canal

Location: From Elliot Creek into Green Mountain Reservoir, just above dam.	
Construction period: 1943	
Length	1.1 mi
Capacity	90 ft³/s
Typical maximum section in earth:	
Bottom width	4 ft
Side slopes:	
In fill	1.5:1
In cut	2:1
Water depth	2 ft
Typical flume section:	
Bottom width	9.5 ft
Water depth	2 ft
Lining thickness	6 in

Willow Creek Feeder Canal

Location: From Willow Creek Dam generally east to Willow Creek Pumping Plant, then to Granby Reservoir.
Construction period: 1951-53

Length	3.4 mi
Capacity	400 ft³/s
Typical maximum section in earth:	
Bottom width	14 ft
Side slopes	1.5:1
Water depth	6.9 ft
Typical maximum section, concrete lined:	
Bottom width	5 ft
Side slopes	1.5:1
Water depth	5.2 ft
Lining thickness	4 in

Granby Pump Canal

Location: From Granby Pumping Plant to Shadow Mountain Lake.
Construction period: 1949-50

Length	1.8 mi
Capacity	1,100 ft³/s
Typical maximum section in earth:	
Bottom width	20 ft
Side slopes	2:1
Water depth	10.5 ft
Typical maximum section, gravel lined:	
Bottom width	20 ft
Side slopes	2:1
Water depth	10.5 ft
Lining thickness	3-4.5 ft

Alva B. Adams Tunnel

Location: From Grand Lake east to a point on Wind River about 4.5 mi southwest of Estes Park, Colo.
Construction period: 1940-47

Length	13 mi
Capacity	550 ft³/s
Cross section: Circular	
Diameter	9.75 ft
Lining: Concrete	

Aspen Creek Siphon

Location: From Parshall flume section at East Portal Reservoir to Rams Horn Tunnel.
Construction period: 1947-48

Length	1.3 mi
Capacity	550 ft³/s
Diameter	10.75 ft

Rams Horn Tunnel

Location: End of cut-and-cover flume section from Aspen Creek Siphon northeast to penstock gate structure for Marys Lake Powerplant.
Construction period: 1946-47

Length	1.3 mi
Capacity	550 ft³/s
Cross section: Horseshoe	
Diameter	10 ft
Lining: Concrete	

Prospect Mountain Conduit

Location: From outlet in Marys Lake Dike No. 1 eastward to Prospect Mountain Tunnel.
Description: Reinforced-concrete pressure conduit (covered)
Construction period: 1947-49

Length	0.6 mi
Capacity	1,300 ft³/s
Diameter	12.5 ft

Prospect Mountain Pressure Tunnel

Location: From Prospect Mountain Conduit northeast to surge tank and Estes Powerplant penstock gate structure.
Construction period: 1946-48

Length	1.1 mi
Capacity	1,300 ft³/s
Cross section: Circular	
Diameter	12.5 ft
Lining: Concrete	

Olympus Siphon

Location: From Olympus Dam to Olympus Tunnel.
Construction period: 1950
Type: Monolithic concrete pipe

Length	0.8 mi
Capacity	550 ft³/s
Diameter	10.75 ft

Olympus and Pole Hill Tunnels

Location: From Olympus Siphon east to Pole Hill Canal. The tunnels are connected by a short length of covered conduit.
Construction period: 1949-52

Length (Olympus, 1.8; Pole Hill, 5.4)	7.2 mi
Capacity	550 ft³/s
Cross section: Horseshoe	
Diameter	9.75 ft
Lining: Concrete	

Pole Hill Canal

Location: From end of Pole Hill Tunnel to Pole Hill Powerplant penstock gate structure.
Construction period: 1952

Length	0.5 mi
Capacity	550 ft³/s
Typical maximum section, concrete lined:	
Bottom width	7 ft
Side slopes	1.25:1
Water depth	7.4 ft
Lining thickness	4 in
Typical maximum section, bench flume:	
Bottom width	16.3 ft
Water depth	7.4 ft
Lining thickness	8 in

Rattlesnake Siphon and Tunnel

Location: From Pole Hill Powerplant Afterbay east to Pinewood Reservoir.
Construction period: 1950-52

Length	1.7 mi
(Outlet through dam, 9.75-ft-diameter concrete siphon, 274 ft long, crosses creek bed).	
Capacity	550 ft³/s
Cross section (tunnel): Horseshoe	
Diameter	9.75 ft
Lining: Concrete	

Bald Mountain Pressure Tunnel

Location: From Pinewood Reservoir east to surge tank, Flatiron Powerplant penstock gate structure.

Construction period: 1950-52

Length	1.3 mi
Capacity	960 ft³/s
Cross section: Circular	
Diameter	10.5 ft
Lining: Concrete	

Carter Lake Pressure Conduit and Tunnel

Location: From Flatiron Powerplant southeast to Carter Lake Reservoir.
Construction period: 1950-52

Length (conduit, 0.2 mi; tunnel, 1.2 mi)	1.4 mi
Capacity	550 ft³/s
Cross section: Circular	
Diameter	8 ft
Lining: Concrete	

Flatiron Canal

Location: Connection between Flatiron Power and Pumping Plant afterbay pool and the Flatiron Reservoir.
Construction period: 1951-53

Length	0.3 mi
Capacity	960 ft³/s
Typical maximum section:	
Bottom width	20 ft
Side slopes	1.5:1
Water depth	18.8 ft

St. Vrain Supply Canal

Location: From Carter Lake Reservoir at Dam No. 1 south to St. Vrain Creek near Lyons, Colo.
Construction period: 1952-54

Length	9.8 mi
Capacity	625 ft³/s
Typical maximum, concrete lined:	
Bottom width	7 ft
Side slopes	1.25:1
Water depth	6 ft
Lining thickness	4 in
Typical maximum section in earth:	
Bottom width	20 ft
Side slopes	1.5:1
Water depth	7.4 ft

Boulder Creek Supply Canal

Location: From turnout near end of St. Vrain Supply Canal generally south to Boulder Creek about 6 mi east of Boulder, Colo. Boulder (municipal) Reservoir on canal line used as carrier.
Construction period: 1953-55

Length	15.7 mi
Capacity	200 ft³/s
Typical maximum section in earth:	
Bottom width	12 ft
Side slopes	1.5:1
Water depth	4.6 ft
Typical maximum section in rock:	
Bottom width	12 ft
Side slopes	0.5:1
Water depth	4.3 ft
Typical maximum section, compacted earth lined:	
Bottom width	12 ft
Side slopes	1.5:1
Water depth	4.6 ft
Lining thickness:	
Sides	3 ft
Bottom	1.5 ft

South Platte Supply Canal

Location: From Boulder Creek about 8 mi east of Boulder, Colo., generally northeast to vicinity of Fort Lupton, Colo. Coal Ridge Waste Lake on canal line and used as carrier.
Construction period: 1954-56

Length	32.2 mi
Capacity	230 ft³/s
Typical maximum section in earth:	
Bottom width	20 ft
Side slopes	2:1
Water depth	3.2 ft

Charles Hansen Feeder Canal

Location: From Flatiron Reservoir generally north to Horsetooth Reservoir—Flatiron section to Big Thompson turnout; Horsetooth section to reservoir.
Construction period: 1949-53

Length:	
Flatiron section	3.8 mi
Horsetooth section	9.4 mi

Typical maximum section, concrete lined:

	Flatiron	*Horsetooth*
Capacity	930 ft³/s	550 ft³/s
Bottom width	13 ft	7 ft
Side slopes	1.25:1	1.25:1
Water depth	8.8 ft	8.2 ft
Lining thickness	4 in	4 in

Typical maximum section in rock:	
Bottom width	15 ft
Side slopes	1:1
Water depth	8.1 ft

Dixon Feeder Canal

Location: From Soldier Canyon Dam to College Lake and Dixon Canyon Reservoir.
Construction period: 1950

Length	3 mi
Capacity	8 ft³/s
Typical maximum section in earth:	
Bottom width	3 ft
Side slopes	1.5:1
Water depth	1 ft

Charles Hansen Canal

Location: From Horsetooth Dam generally north to Cache la Poudre River.
Construction period: 1950-52

Length	5.1 mi
Capacity	1,500 ft³/s
Typical maximum section in earth:	
Bottom width	32 ft
Side slopes	1.5:1
Water depth	10.8 ft
Typical maximum section, concrete lined:	
Bottom width	12 ft
Side slopes	1.25:1
Water depth	7.2 ft
Lining thickness	4 in
Length	2.8 mi

Windsor Extension Canal

Location: From Charles Hansen Canal near the Cache la Poudre River to existing Poudre Valley Canal.
Construction period: 1952

Length	0.5 mi
Capacity	250 ft³/s

Typical maximum section, concrete bench flume:		
Width	8	ft
Water depth	5	ft
Wall thickness	8	in
Typical maximum section, concrete lined:		
Bottom width	7	ft
Side slopes	1.25:1	
Water depth	5.6	ft
Lining thickness	4	in

NORTH POUDRE SUPPLY CANAL

Location: From North Poudre Diversion Dam on the Cache la Poudre River about 11 mi northwest of Fort Collins, generally northeast.		
Construction period: 1951-53		
Length	12.5	mi
Capacity	250	ft³/s
Typical maximum section in earth:		
Bottom width	12	ft
Side slopes	1.5:1	
Water depth	5.6	ft
Typical maximum section in rock:		
Bottom width	14	ft
Side slopes	0.5:1	
Water depth	5.6	ft
Typical maximum section, concrete lined:		
Bottom width	6	ft
Side slopes	1.25:1	
Water depth	5.6	ft
Lining thickness	4	in

PUMPING PLANTS[3]

Designation	Number of units	Total capacity, ft³/s	Total dynamic head, ft	Total horsepower
Granby	3	600	186	18,000
Willow Creek	2	400	175	10,000
Flatiron	1[4]	370	240	13,000

[3]There are 12 small pumping units installed on the project in the Kremmling area. They have capacities of 2 to 12 ft³/s, with a total capacity of 91 ft³/s. Total dynamic heads range from 7.5 to 17 ft, and the installed horsepower ranges from 7.5 to 20.

[4]The unit may be operated in reverse as a generating unit (8,500-kW capacity) to utilize water released back to Flatiron Reservoir from Carter Lake for redistribution via Charles Hansen Canal, or for power purposes only.

Power Facilities

GREEN MOUNTAIN POWERPLANT

Location: At right side, toe of Green Mountain Dam.		
Year of initial operation: 1943		
Year last generator placed in operation: 1943		
Nameplace capacity	21,600	kW
Number and capacity of generators (2)	10,800	kW
Maximum head	261	ft

MARYS LAKE POWERPLANT

Location: At western shore of Marys Lake, 2.5 mi southwest of Estes Park, Colo.		
Year of initial operation: 1951		
Nameplate capacity	8,100	kW
Number of generators	1	
Maximum head	210	ft

ESTES POWERPLANT

Location: At the upper end of Lake Estes near Estes Park, Colo.		
Year of initial operation: 1950		
Year last generator placed in operation: 1950		
Nameplate capacity	45,000	kW
Number and capacity of generators (3)	15,000	kW
Maximum head	572	ft

POLE HILL POWERPLANT

Location: In Little Hell Canyon, 10 mi east of Estes Park, Colo.		
Year of initial operation: 1954		
Nameplate capacity	33,250	kW
Number of generators	1	
Maximum head	840	ft

FLATIRON POWERPLANT

Location: In Chimney Hollow, 10 mi west of Loveland, Colo.		
Year of initial operation: 1954		
Year last generator placed in operation: 1954		
Nameplate capacity	71,500	kW
Number and capacity of generators (2)	31,500	kW
(1)	8,500	kW
Maximum head	1,118	ft

BIG THOMPSON POWERPLANT

Location: On the Big Thompson River 9 mi west of Loveland, Colo.		
Year of initial operation: 1959		
Ultimate nameplate capacity	4,500	kW
Maximum head	183.5	ft

SUBSTATIONS AND SWITCHYARDS

Substations and switchyards	5	
Project also operates two mobile substations and one mobile transformer		
Total capacity of transformers	143,437	kVA

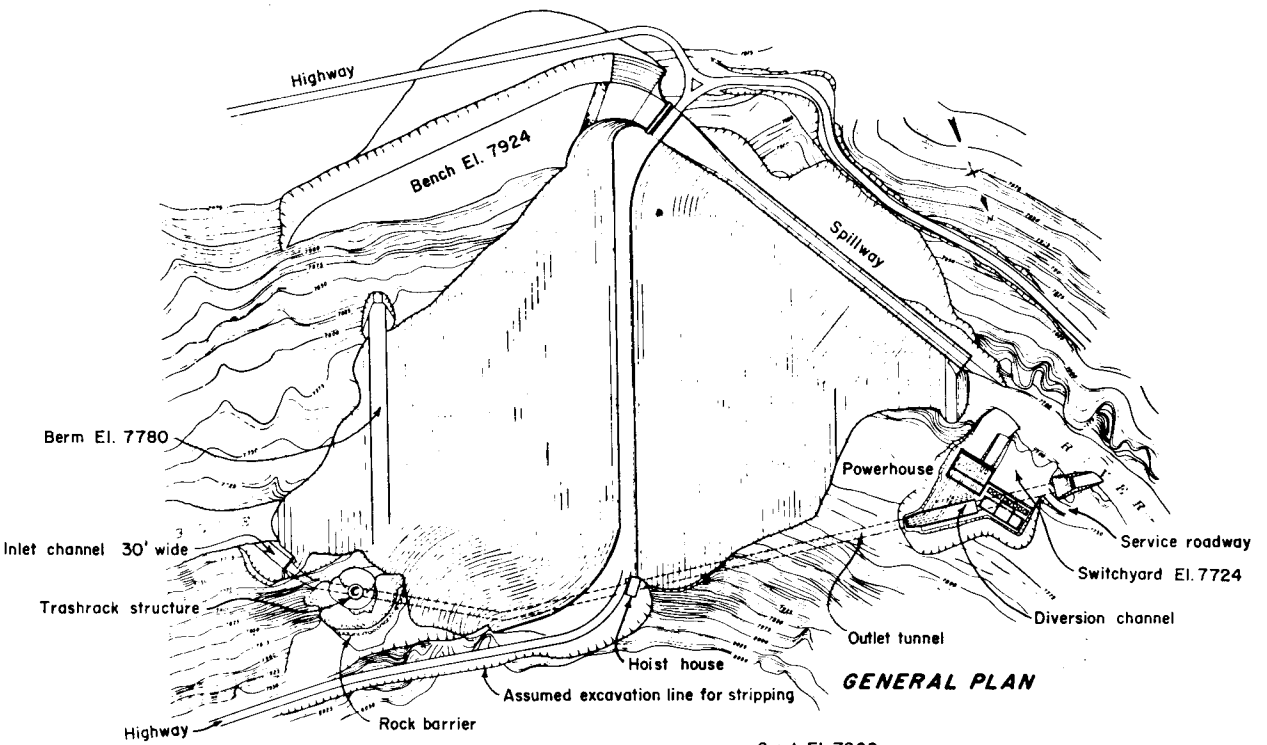
TRANSMISSION LINES

Total number of lines	1
Total circuit miles	3.42

Designation	Capacity kV	Circuit miles	Year placed in service
Beaver Creek—Limon			
Beaver Creek—Woodrow	115	18.46	1951
Woodrow-Morgan Co. REA So. Woodrow Tap	115	9.36	1951
Morgan Co. REA So. Woodrow Tap—Last Chance	115	8.08	1951
YWEA Last Chance—Big Sandy	115	30.27	1951
Big Sandy—Limon	115	3.92	1951&1975
Beaver Creek—Wray			
Beaver Creek—Akron	115	22.18	1950
Akron—YWEA Otis Tap	115	17.12	1950
YWEA Otis Tap—Yuma Tap (Colo.)	115	8.19	1950
Yuma Tap—Eckley Tap	115	10.07	1951
Eckley Tap—Tri-State's Wray Tap	115	13.97	1951
Tri-State's Wray Tap—Wray	115	2.14	1951
Yuma Tap—Yuma (Colo.)	115	0.84	1953
Cheyenne-Flatiron			
Tap near Ault—PV REA Black Hollow Tap	115	5.13	1952
PV REA Black Hollow Tap—Timnath Tap	115	4.53	1952
Timnath Tap—Poudre	115	3.94	1952
Poudre—Station 400	115	4.06	1952
Station 400—P.S. Co. Ft. Collins	115	1.00	1952
P.S. Co. Ft. Collins—Drake Road Tap	115	1.10	1952
Drake Road Tap—T.S. Horseshoe Tap	115	3.80	1952
T.S. Horsetooth Tap—Flatiron	115	11.87	1952

Designation	Capacity kV	Circuit miles	Year placed in service
Erie—Beaver Creek			
Erie—Brighton	115	6.10	1950
Brighton—Hoyt	115	40.42	1952
Hoyt—Morgan Co. REA Adena Tap	115	14.95	1952
Morgan Co. REA Adena Tap—Beaver Creek	115	17.01	1952
Hoyt—Wiggins	115	13.10	1950
Estes—Flatiron	115	16.28	1939
Estes—Marys Lake	115	3.11	1951
Estes—Pole Hill	115	10.29	1953
Flatiron—Kodak			
Flatiron—PV REA Carter Lake Tap	115	2.00	1950
PV REA Carter Lake Tap—Loveland West Tap	115	4.04	1950
Loveland West Tap—Loveland Tap	115	1.49	1950
Loveland Tap—Derby Hill	115	0.83	1950
Derby Hill—Boyd	115	2.27	1950
Boyd—PV REA Kodak West Tap	115	10.17	1950
PV REA Kodak West Tap—Kodak	115	2.80	1971
Loveland Tap—Loveland	115	0.89	1950
PV REA Kodak West Tap—Windsor	115	0.13	1950
Flatiron—Pole Hill	115	4.83	1950
Flatiron—PV REA Lyons Tap	115	10.83	1950
Greeley—Rosedale	115	4.61	1940
Green Mountain—Summit			
Green Mountain—Henderson Temporary Tap	115	12.41	1938
Henderson Temp. Tap—Summit	115	15.81	1938
Kodak-Weld			
Kodak—PV REA Kodak East Tap	115	2.59	1971
PV REA Kodak East Tap—Weld	115	2.82	1950
Windsor—PV REA Kodak East Tap	115	0.57	1950
Longmont Northwest—Erie			
Longmont Northwest—Longmont Tap	115	3.30	1950
Longmont Tap—Erie	115	14.10	1950
Longmont Tap—Longmont	115	0.23	1951
PV REA Lyons Tap—Longmont Northwest			
PV REA Lyons Tap—Hygiene	115	0.08	1950
Hygiene—Longmont Northwest	115	3.19	1950
Sidney—Beaver Creek			
Sterling—MC REA Messex Tap	115	21.38	1948
MC REA Messex Tap—Beaver Creek	115	14.40	1948
Weld—Beaver Creek			
Weld—Point near Rosedale	115	14.19	1940
Point near Rosedale—PV REA Kersey Tap	115	7.43	1940
PV REA Kersey Tap—Prospect Valley Tap	115	7.86	1940
Prospect Valley Tap—MC REA Orchard Tap	115	16.66	1940
MC REA Orchard Tap—Wiggins Tap	115	0.99	1940
Wiggins Tap—Bijou Tap	115	8.68	1940
Bijou Tap—Ft. Morgan Tap	115	7.70	1940
Ft. Morgan Tap—Ft. Morgan East Sub. Tap	115	1.03	1940
Ft. Morgan East Sub. Tap—Brush Tap	115	9.92	1940
Brush Tap—Beaver Creek	115	0.77	1940
Prospect Valley Tap—Morgan Co. Lost Creek Tap	115	7.31	1944
Morgan Co. Lost Creek Tap—Prospect Valley	115	8.12	1944
Wiggins Tap—Wiggins	115	5.97	1940
Ft. Morgan Tap—Ft. Morgan	115	0.02	1940
Brush Tap—Brush	115	0.01	1940
Estes—Granby PP			
Estes—East Portal	69	5.99	1951
West Portal—Grand Lake Tap	69	2.84	1939
Grand Lake Tap—Shadow Mt. Tap	69	2.69	1939
Shadow Mt. Tap—Granby PP	69	3.42	1939
Shadow Mt. Tap—Shadow Mt.	69	0.89	1939
Green Mountain—Granby Pumping Plant			
Green Mtn—Kremmling Tap	69	10.13	1939
Kremmling Tap—Troublesome Tap	69	4.45	1939
Troublesome Tap—Wm Fork Tap (Denver)	69	5.81	1939
Wm Fork Tap (Denver) — Windy Gap Tap	69	11.78	1939
Windy Gap Tap—Granby	69	5.53	1939
Granby—Granby PP	69	6.18	1939
Kremmling Tap—Muddy Pass	69	29.71	1951
Granby—Willow Creek Pumping Plant	69	0.70	1953
Sterling—Holyoke			
Sterling—Fleming	69	19.40	1948
Fleming—Crook Tap	69	2.06	1948
Crook Tap—Haxtun	69	9.44	1948
Haxtun—Holyoke	69	17.35	1948
Granby—Granby Dam (Station Service)	24.9	1.60	1946
Flatiron—Big Thompson	13.8	4.32	1957
Flatiron—Pole Hill	13.8	4.87	1950
Troublesome—Colo. River Improvement	12.5	10.00	1947
Estes—Marys Lake[5]	6.9	3.42	1951

[5]Bureau of Reclamation retained control of this transmission line, all other lines transferred to DOE in 1977.



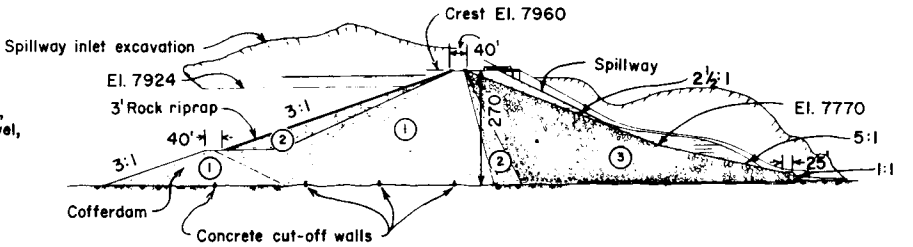
GENERAL PLAN

EMBANKMENT EXPLANATION

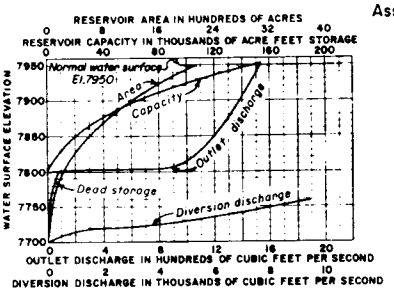
(1) Impervious material of clay, sand, and gravel rolled in 6 inch layers.

(2) Semi-impervious material, graded from clay, sand and gravel at inner slope to sand, gravel, cobbles, and slide rock at outer slope.

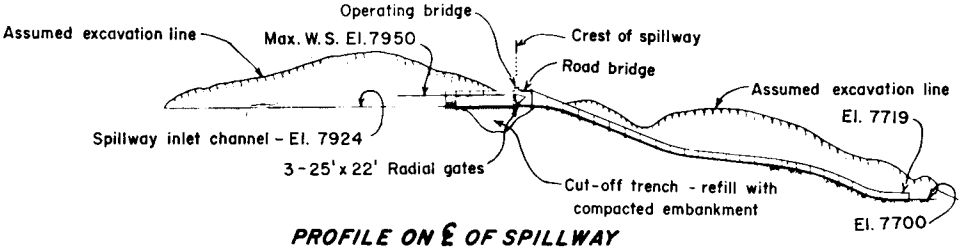
(3) Porous material of cobbles and coarse slide rock.



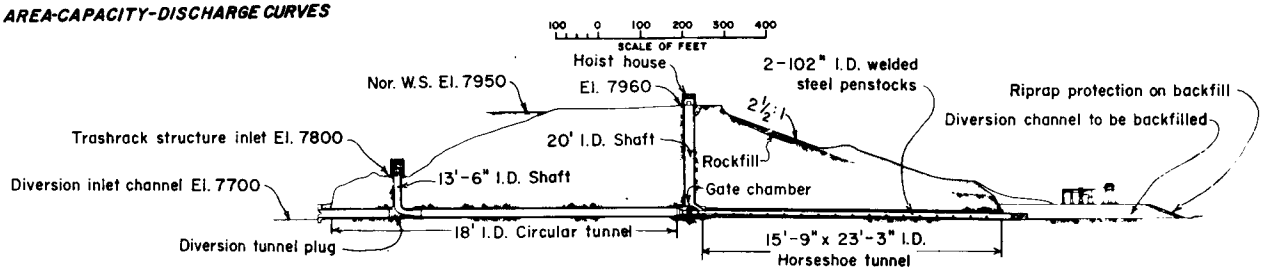
SECTION IN RIVER CHANNEL



AREA-CAPACITY-DISCHARGE CURVES

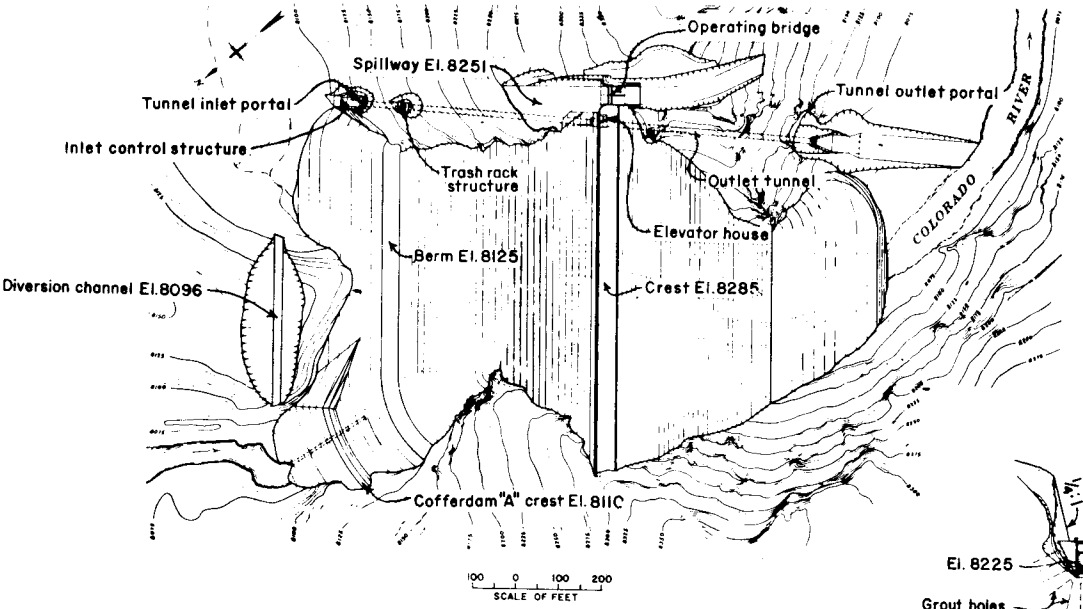


PROFILE ON ℄ OF SPILLWAY

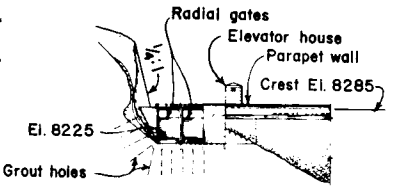


PROFILE ON ℄ OF OUTLET TUNNEL

Green Mountain Dam, Plan and Sections



GENERAL PLAN



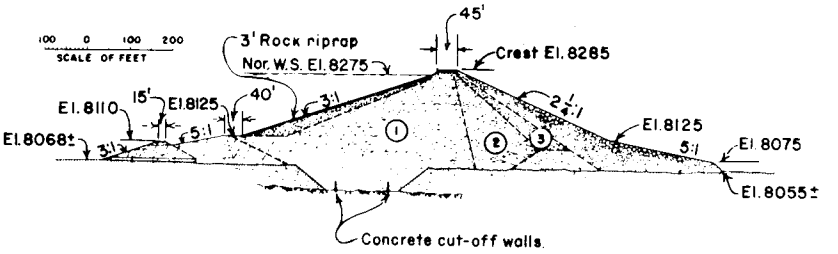
SPILLWAY ELEVATION

EMBANKMENT EXPLANATION

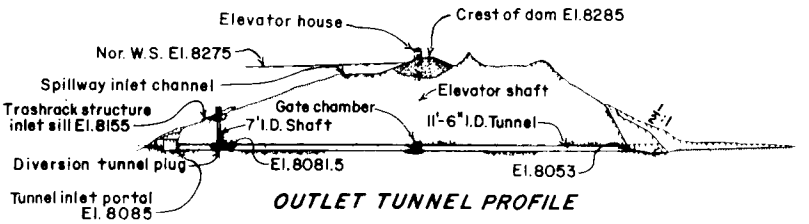
① Impervious, selected clay, sand and gravel composition-rolled into 6-inch compacted layers.

② Semi-pervious, selected clay, sand and gravel-graduated in coarseness to outer slopes-rolled into 6-inch compacted layers.

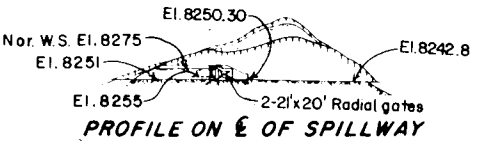
③ Pervious-selected sand and gravel composition-rolled into 6-inch compacted layers.



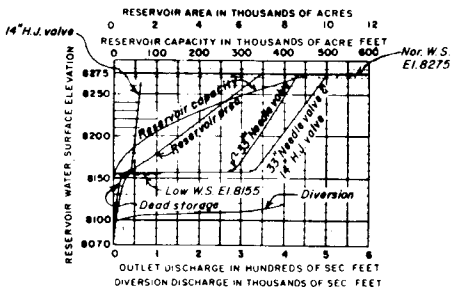
SECTION IN RIVER CHANNEL



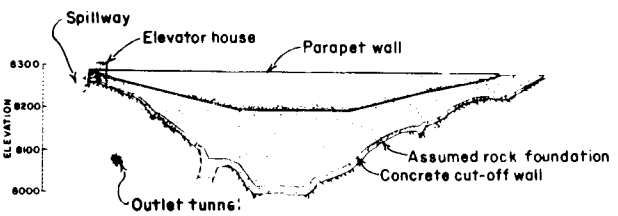
OUTLET TUNNEL PROFILE



PROFILE ON ℄ OF SPILLWAY

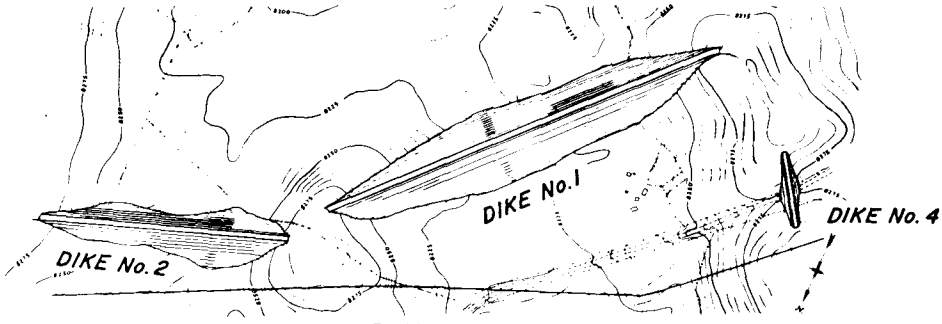


AREA-CAPACITY-DISCHARGE CURVES

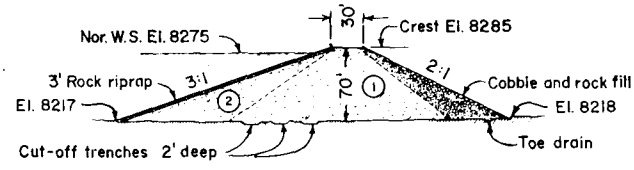


MAIN CUT-OFF WALL PROFILE

Granby Dam, Plan and Sections



PLAN

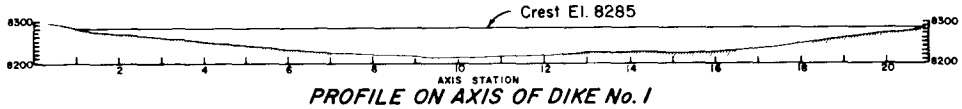


DIKE No. 1 MAXIMUM SECTION

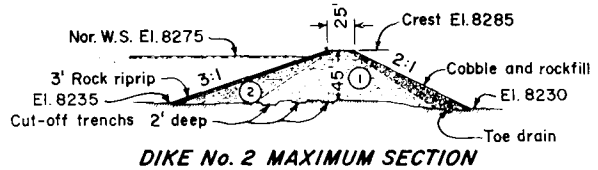
EMBANKMENT EXPLANATION

(1) Impervious material of clay, sand and gravel rolled in 6-inch layers.

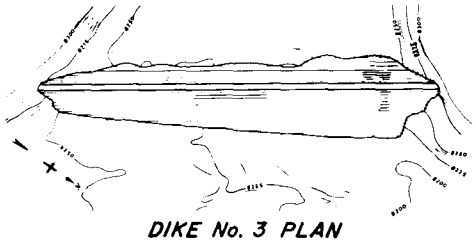
(2) Semi-pervious material, graded from clay, sand and gravel at inner slope to sand, gravel, cobbles and rock at outer slope.



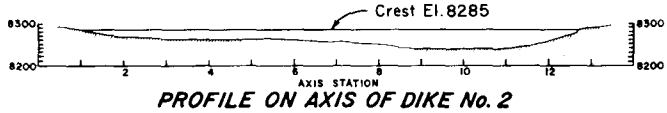
PROFILE ON AXIS OF DIKE No. 1



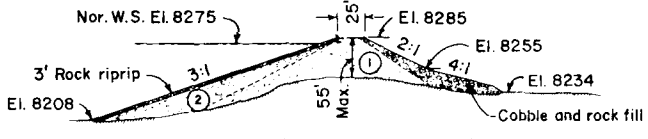
DIKE No. 2 MAXIMUM SECTION



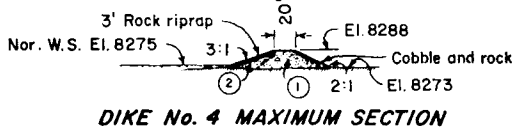
DIKE No. 3 PLAN



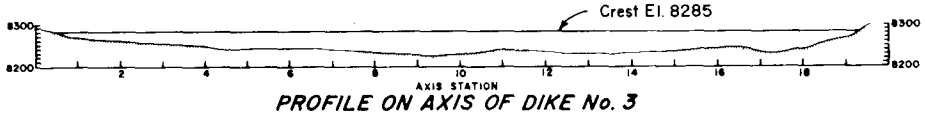
PROFILE ON AXIS OF DIKE No. 2



DIKE No. 3 MAXIMUM SECTION

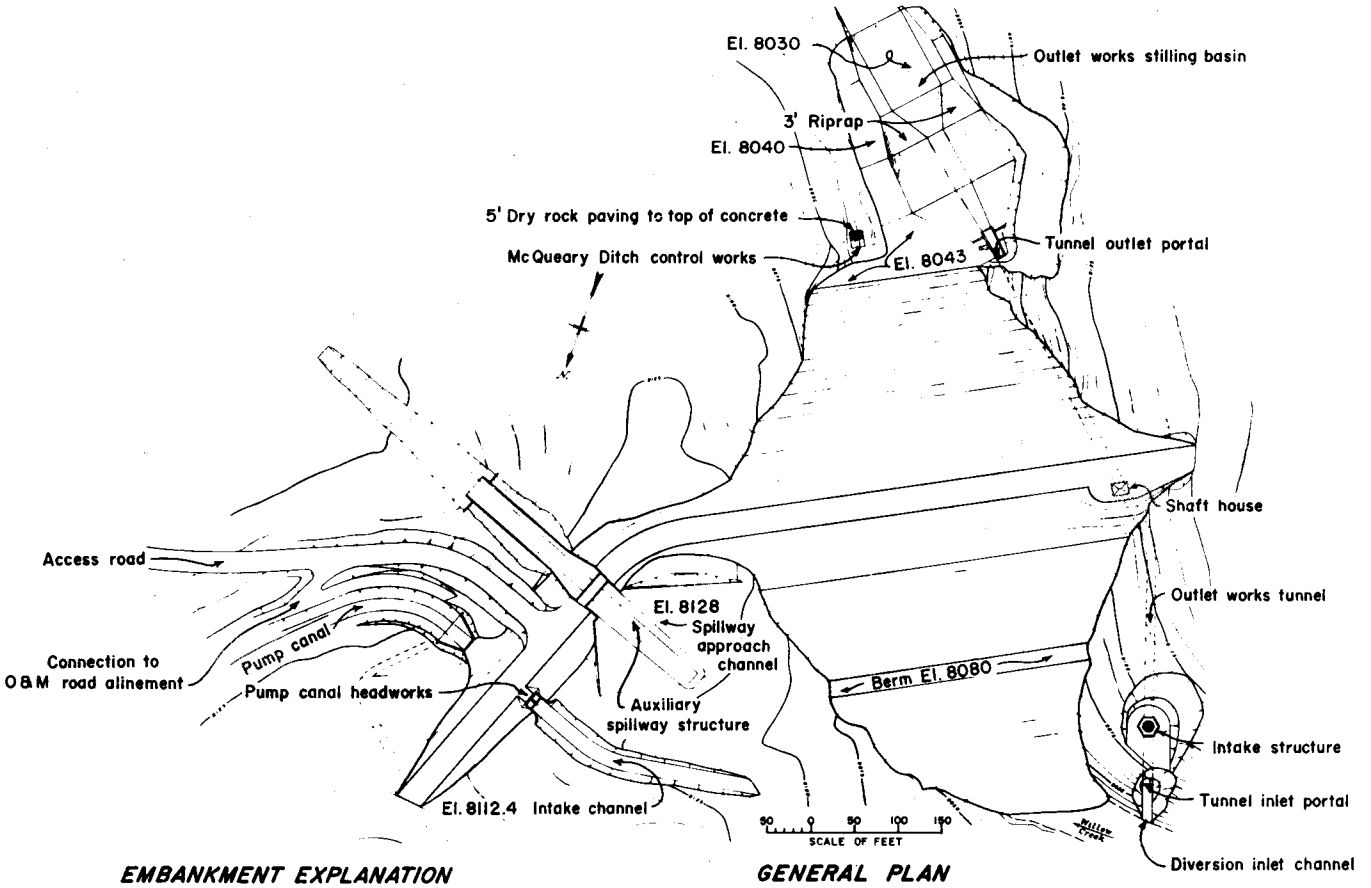


DIKE No. 4 MAXIMUM SECTION



PROFILE ON AXIS OF DIKE No. 3

Granby Dikes, Plan and Sections

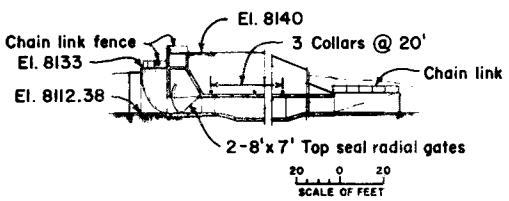


GENERAL PLAN

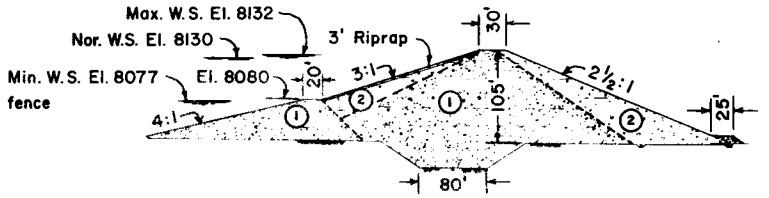
EMBANKMENT EXPLANATION

(1) Selected clay, sand, and gravel compacted by tamping rollers to 6-inch layers.

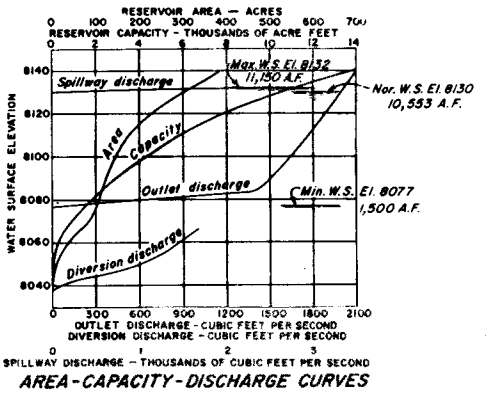
(2) Selected sand, gravel, and cobbles, compacted by crawler type tractors to 12-inch layers.



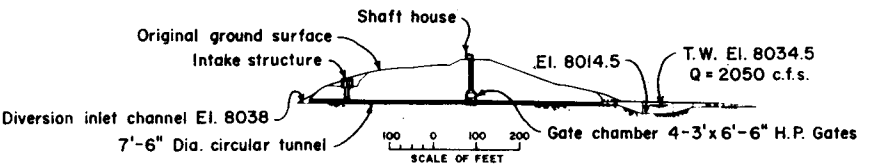
PROFILE OF PUMP CANAL HEADWORKS



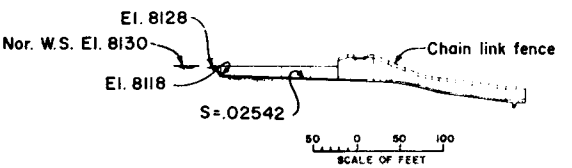
MAXIMUM SECTION



AREA-CAPACITY-DISCHARGE CURVES

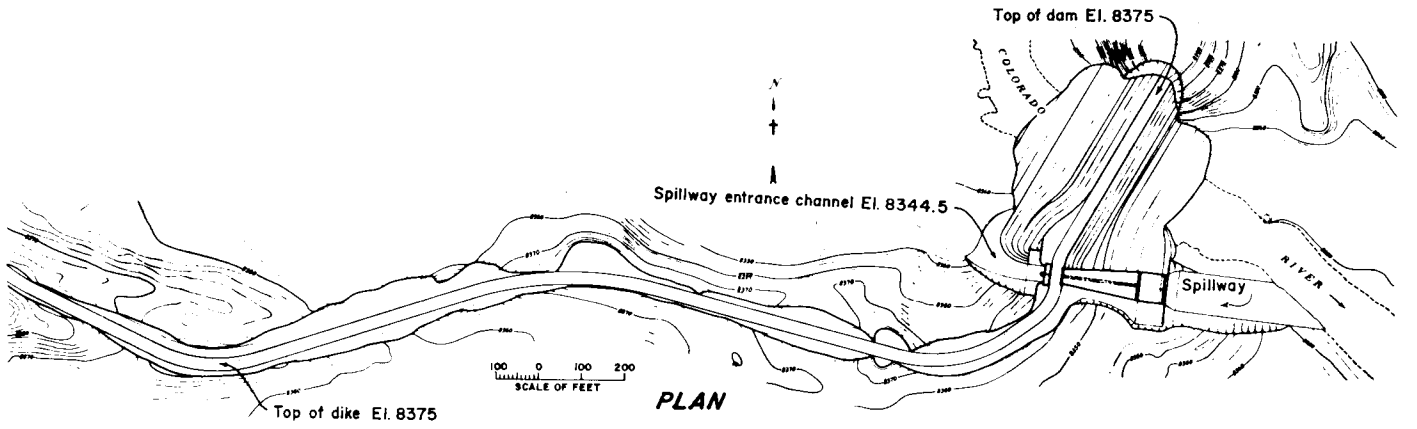


PROFILE ON ℄ OUTLET WORKS

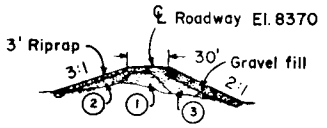


PROFILE ON ℄ AUXILIARY SPILLWAY STRUCTURE

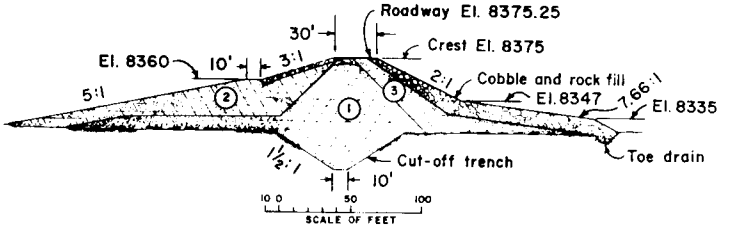
Willow Creek Dam, Plan and Sections



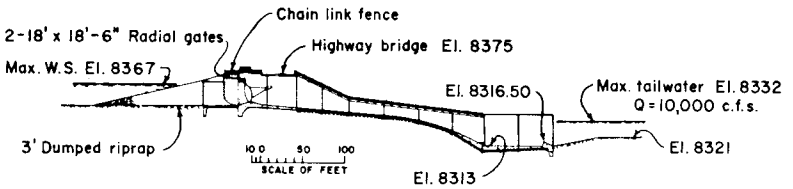
PLAN



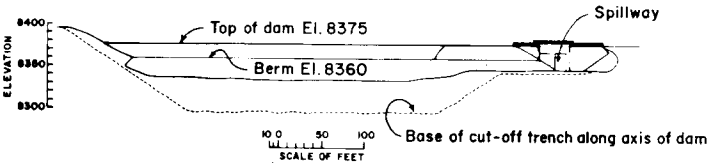
SECTION THRU DIKE



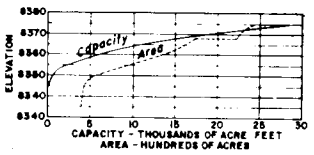
MAXIMUM SECTION



PROFILE ALONG ℄ OF SPILLWAY

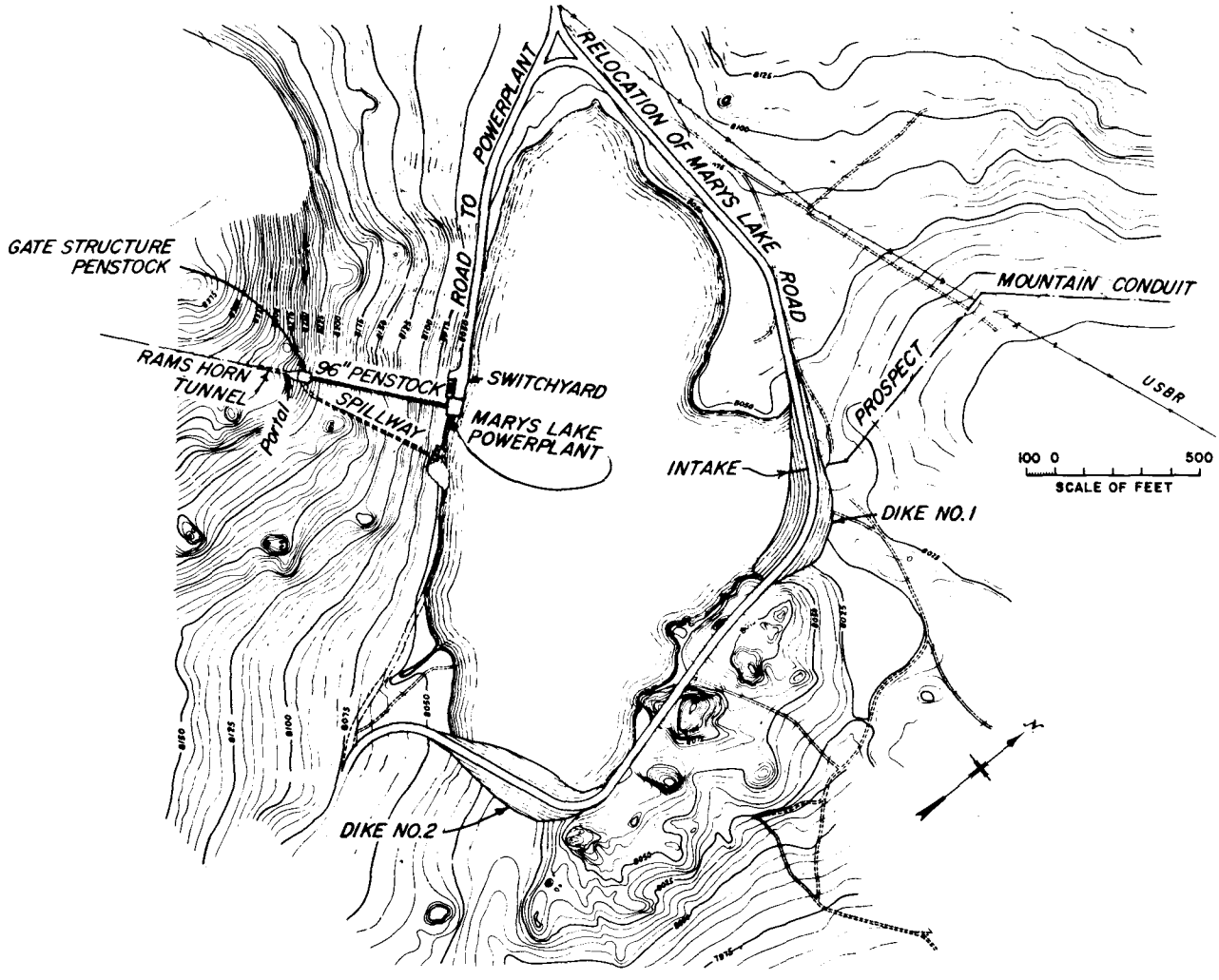


UPSTREAM ELEVATION



AREA AND CAPACITY CURVES

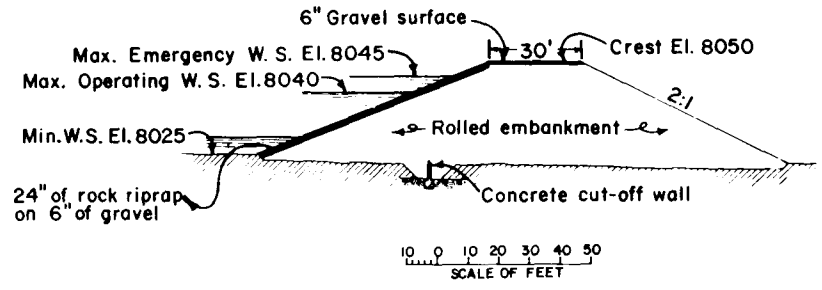
Shadow Mountain Dam, Plan and Sections



PLAN

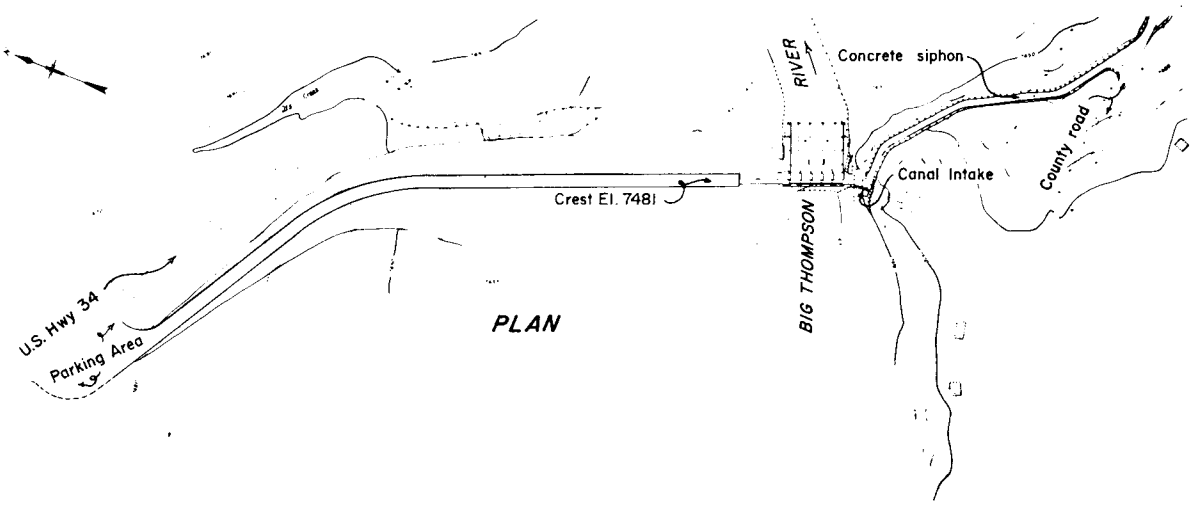
RESERVOIR CAPACITY

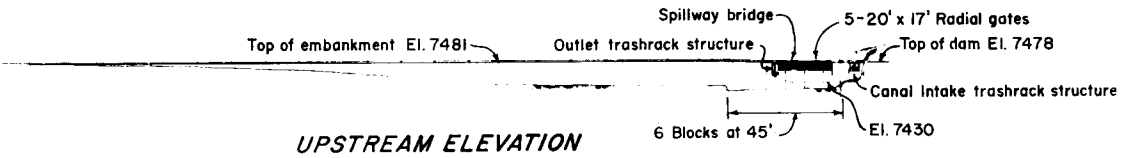
ELEVATION	AREA (ACRES)	CAPACITY (ACRE-FT)
8025	29.35	0
8030	34.57	160
8035	39.21	344
8040	42.49	548
8045	46.03	769
8050	49.91	1009

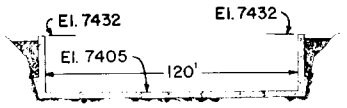


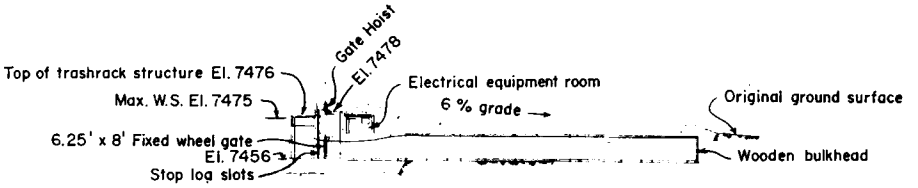
MAXIMUM SECTION OF DIKES

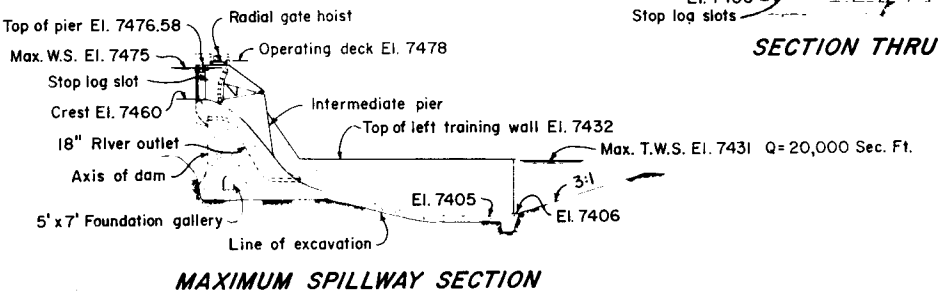
Marys Lake, Plan and Section of Dikes

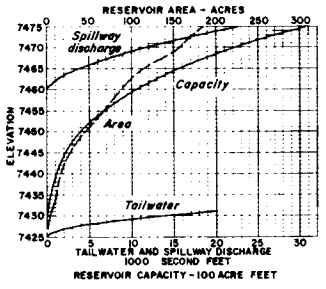




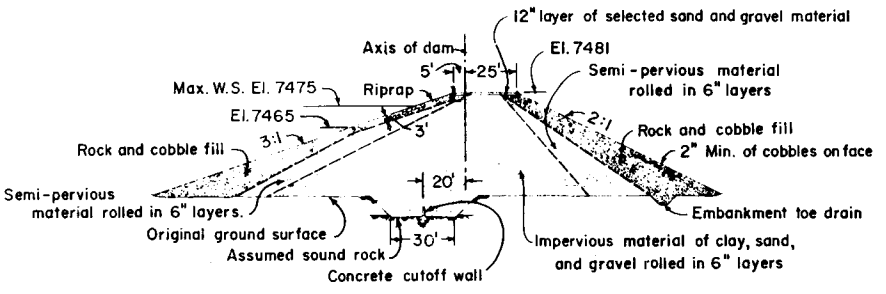




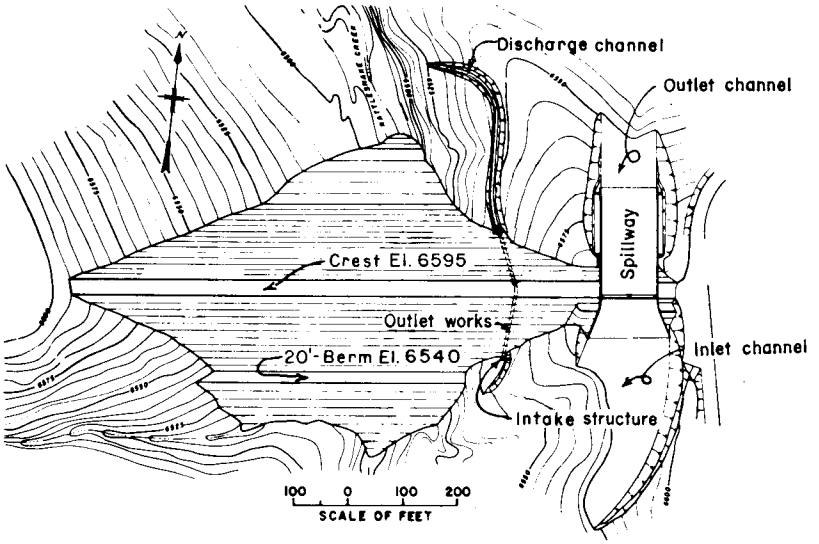




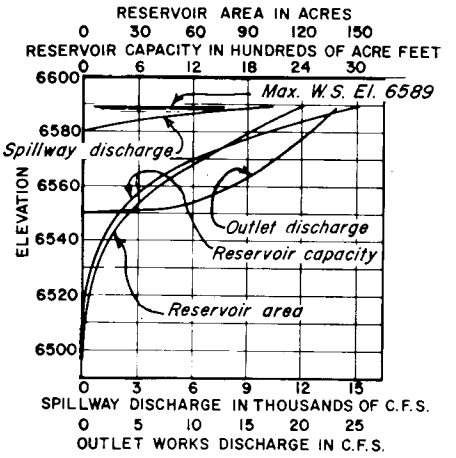
AREA, CAPACITY, AND DISCHARGE CURVES

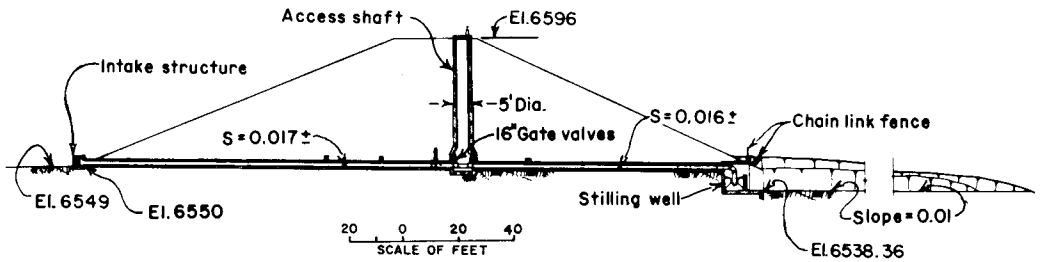


Olympus Dam, Plan and Sections

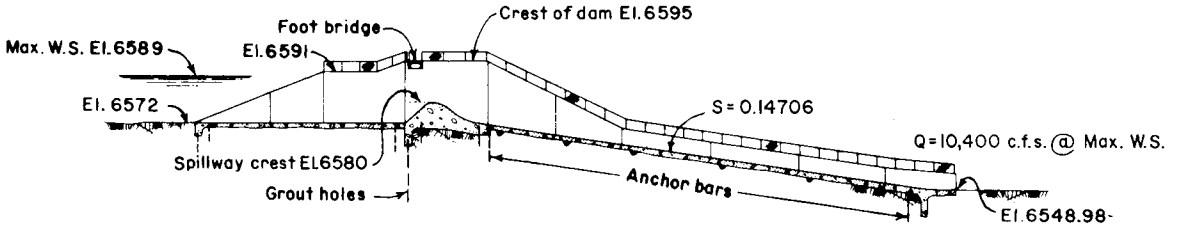


GENERAL PLAN

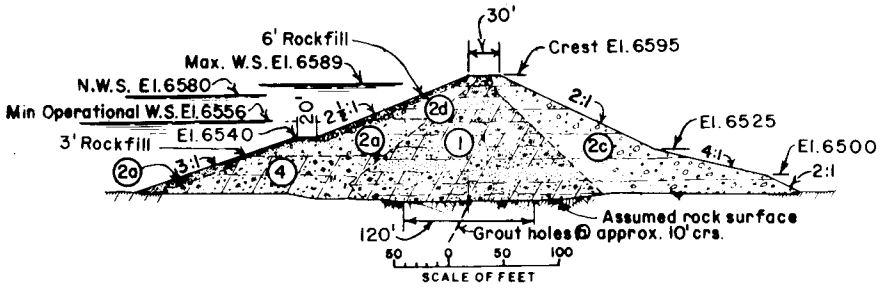




PROFILE ON ℄ OF OUTLET WORKS



PROFILE ON ℄ OF SPILLWAY



MAXIMUM SECTION

EMBANKMENT EXPLANATION

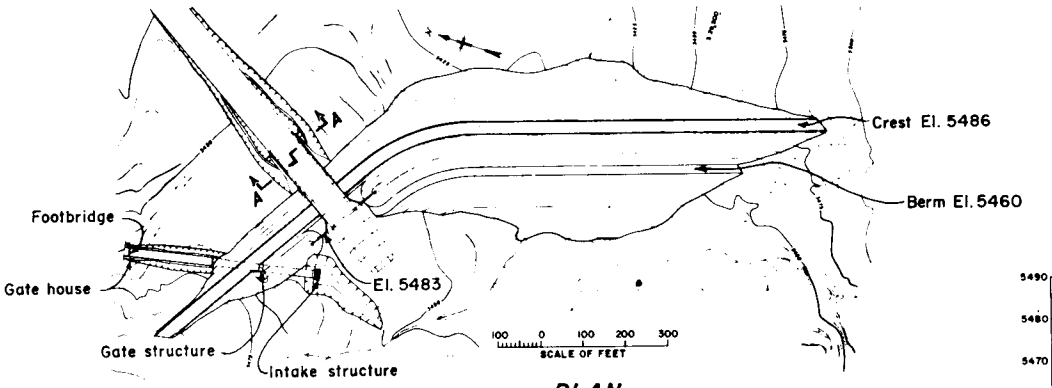
(1) Selected clay, sand and gravel compacted by tamping rollers to 6-inch layers.

(2a) Selected rock fines compacted by crawler type tractors to 12-inch layers.

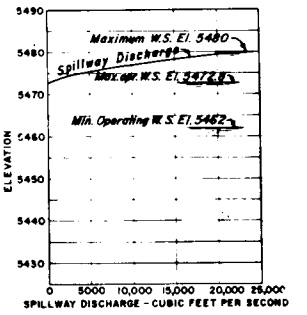
(2c) (2d) Composite fill.

(4) Selected clay, sand, gravel, and rock fragments compacted by tamping rollers to 12-inch layers.

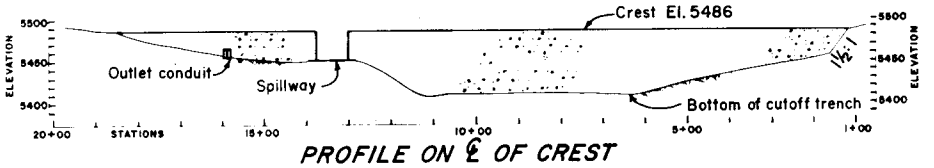
Rattlesnake Dam, Plan and Sections



PLAN



DISCHARGE CURVE



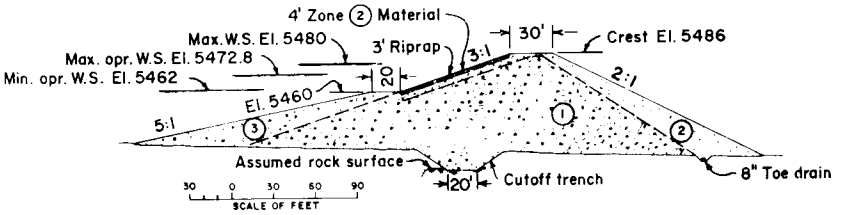
PROFILE ON ℄ OF CREST

EMBANKMENT EXPLANATION

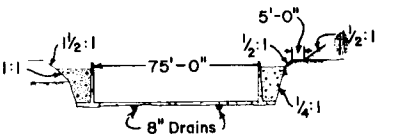
① Selected clay, sand, and gravel compacted by tamping rollers to 6-inch layers.

② Selected sand, gravel, and cobbles compacted by crawler-type tracters to 12-inch layers.

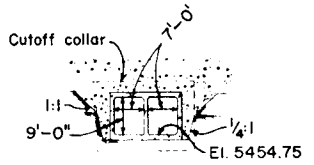
③ Selected clay, sand, gravel, cobbles, and rock compacted by equipment travel to 24-inch layers.



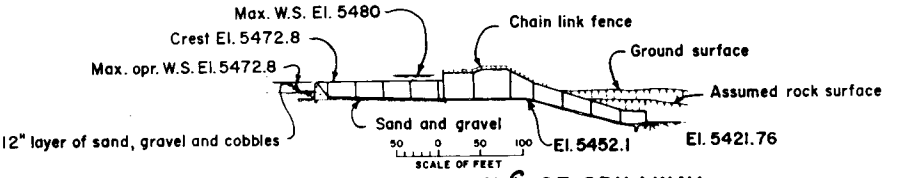
MAXIMUM SECTION



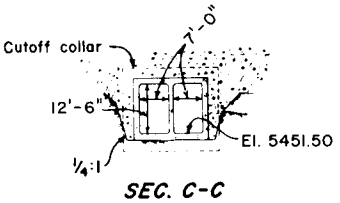
SEC. A-A



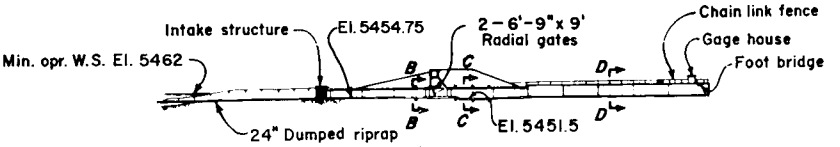
SEC. B-B



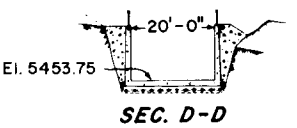
PROFILE ON ℄ OF SPILLWAY



SEC. C-C

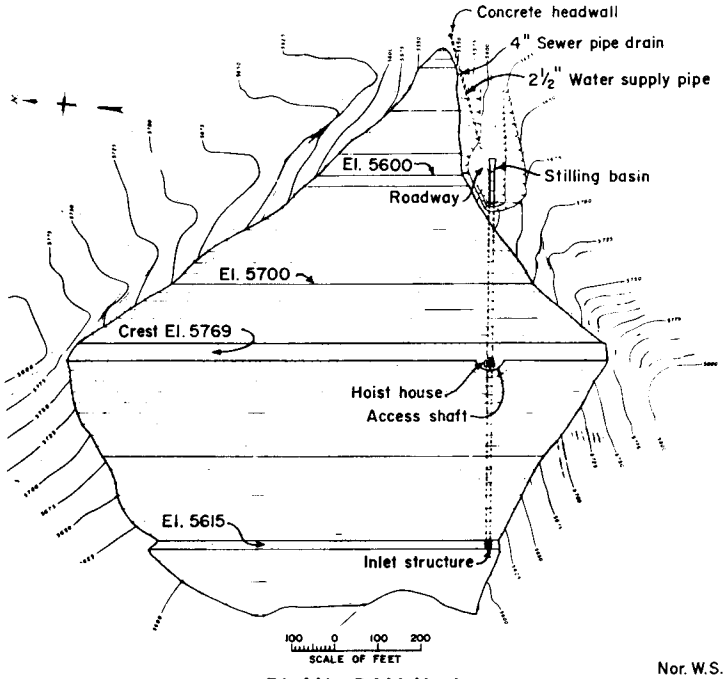


PROFILE ON ℄ OF OUTLET WORKS

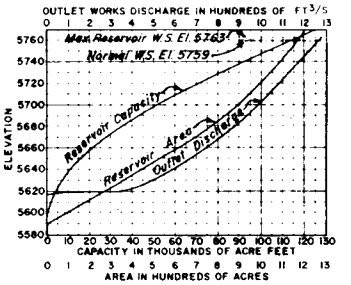


SEC. D-D

Flatiron Dam, Plan and Sections



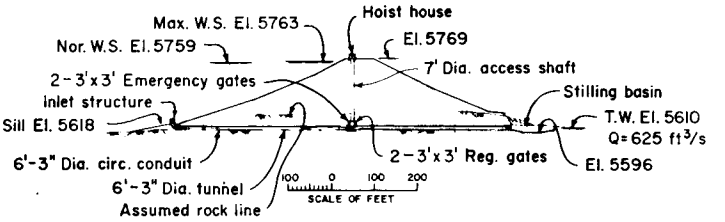
PLAN DAM No. 1



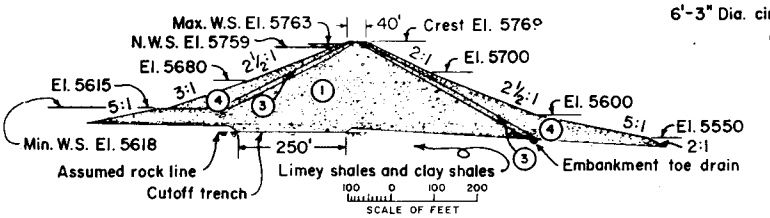
AREA, CAPACITY, AND DISCHARGE CURVES

EMBANKMENT EXPLANATION

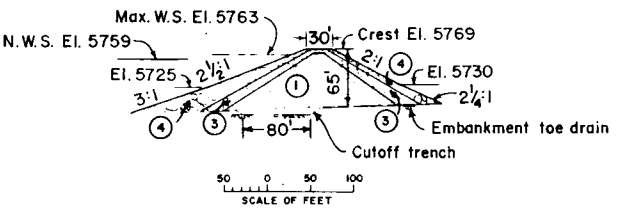
(1) Impervious material of clay, sand and gravel compacted by rollers to 6" layers.
(3) Rock fines compacted to 12" layers by crawler type tractors.
(4) Rock fill increasing in coarseness toward outer slope.



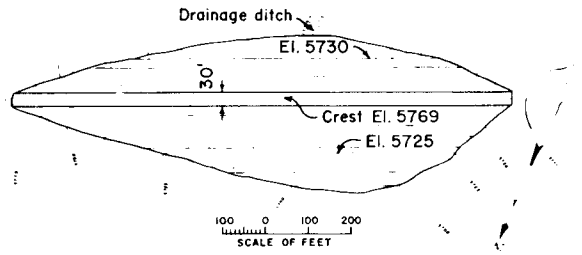
PROFILE ALONG ℄ OUTLET WORKS



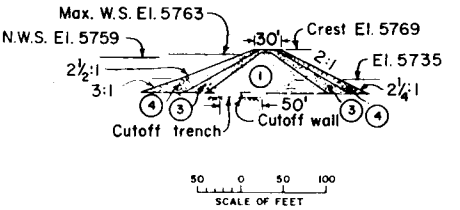
MAXIMUM SECTION DAM No. 1



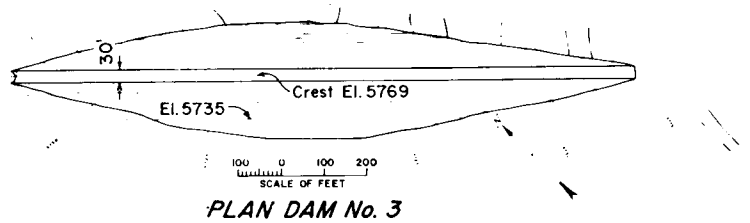
MAXIMUM SECTION - DAM No. 2



PLAN DAM No. 2

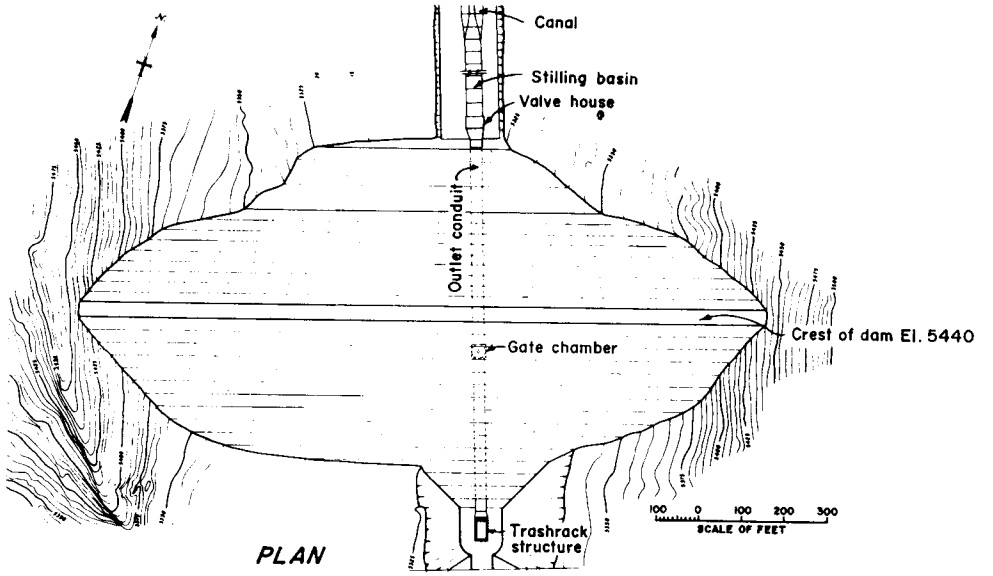


MAXIMUM SECTION DAM No. 3

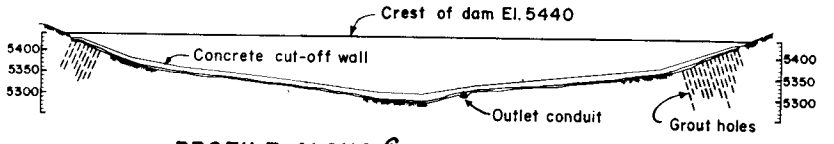


PLAN DAM No. 3

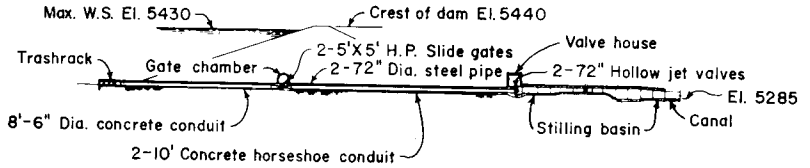
Carter Lake Dams, Plan and Sections



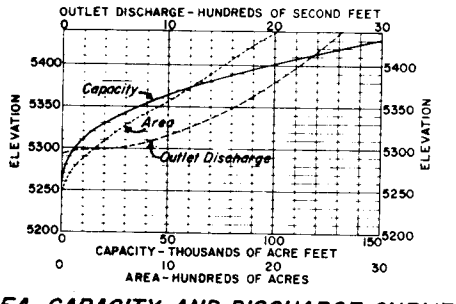
PLAN



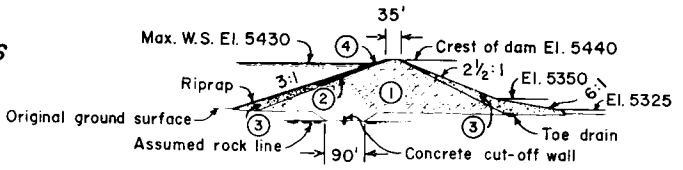
PROFILE ALONG ℄ OF CUT-OFF WALL



PROFILE ALONG ℄ OF OUTLET WORKS



AREA, CAPACITY AND DISCHARGE CURVES

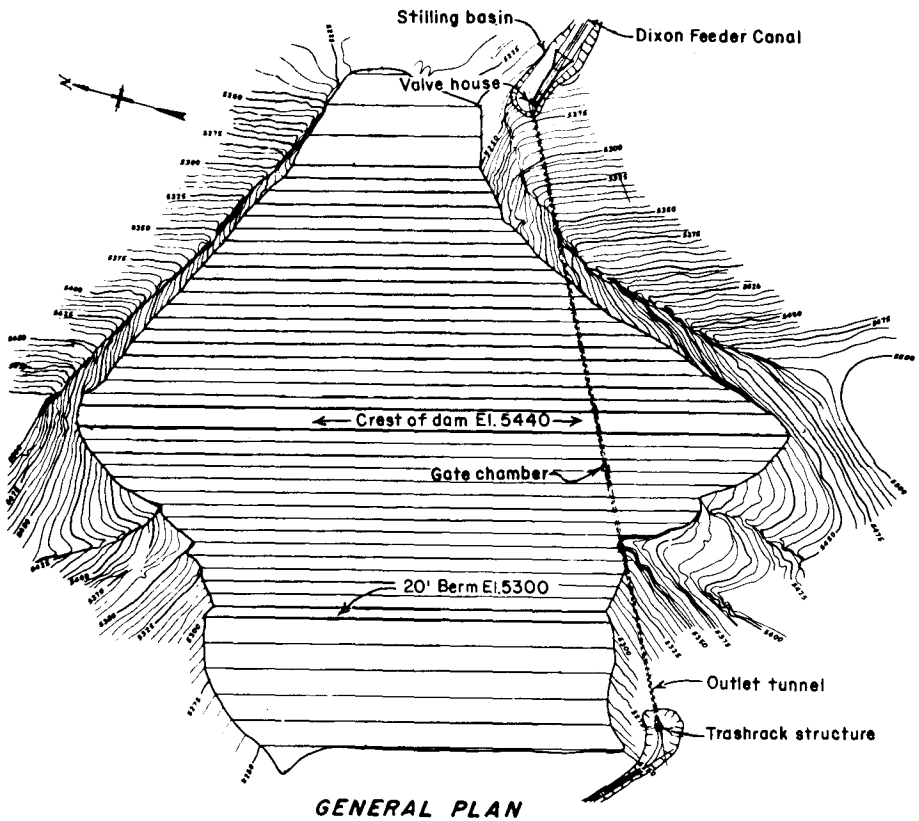


MAXIMUM SECTION

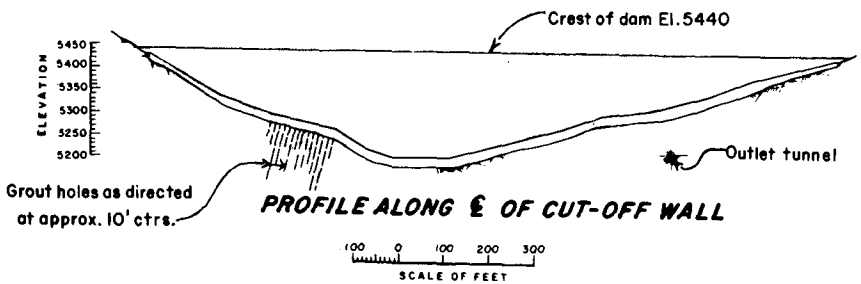
EMBANKMENT EXPLANATION

(1) Impervious material of clay, sand and gravel, graduated in coarseness toward outer slopes compacted in 6" layers.
(2) Rock fines compacted in 12" layers.
(3) Pervious material of sand, gravel and cobbles, compacted in 12" layers.
(4) Rock fill graduated in coarseness toward outer slope

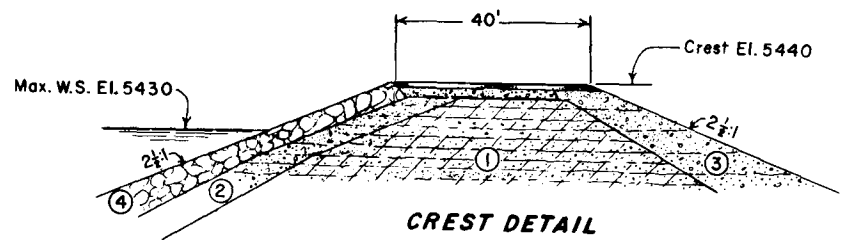
Horsetooth Dam, Plan and Sections



GENERAL PLAN



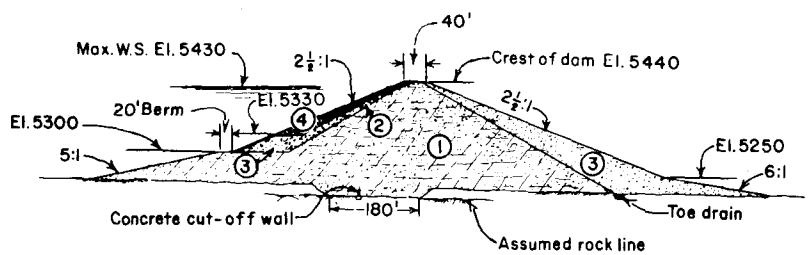
PROFILE ALONG ℄ OF CUT-OFF WALL



CREST DETAIL

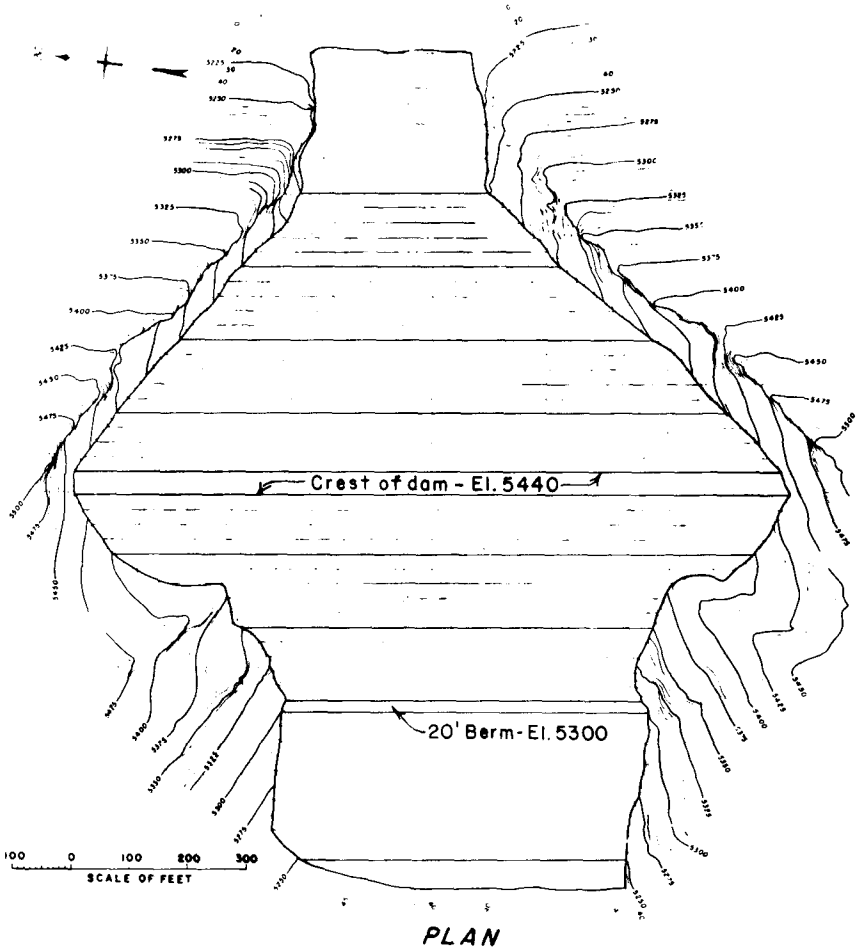
EMBANKMENT EXPLANATION

1. Impervious material of clay, sand, and gravel, graduated in coarseness toward outer slopes, compacted in 6" layers.
2. Rock fines compacted in 12" layers.
3. Pervious material of sand, gravel, and cobbles, compacted in 12" layers.
4. Rockfill graduated in coarseness toward outer slopes.



MAXIMUM SECTION

Soldier Canyon Dam, Plan and Sections



PLAN

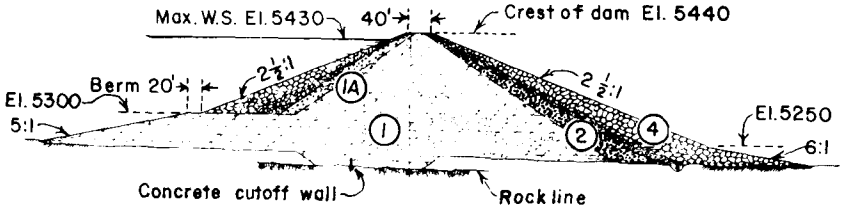
EMBANKMENT EXPLANATION

(1) Impervious material of clay, sand and gravel, graduated in coarseness toward outer slopes, compacted in 6" layers.

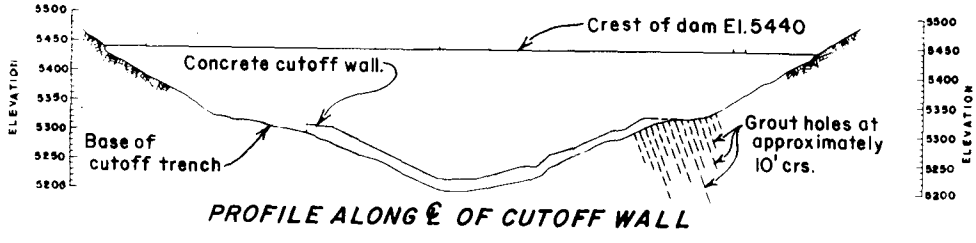
(1A) Semipervious sand and gravel compacted in 12" layers.

(2) Rock fines compacted in 12" layers.

(4) Rockfill graduated in coarseness toward outer slope.

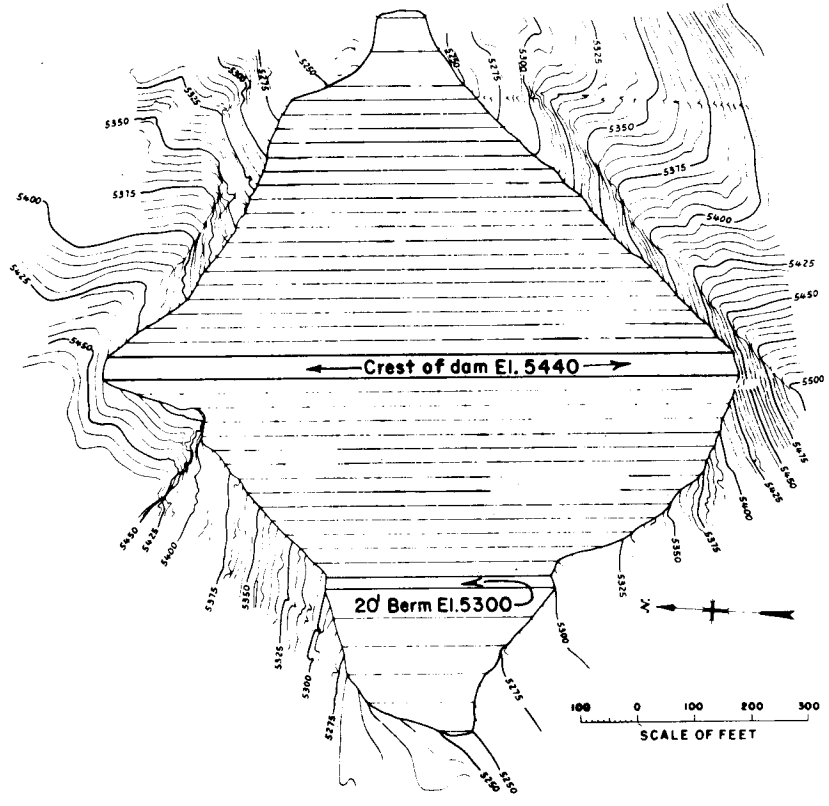


MAXIMUM SECTION



PROFILE ALONG ℄ OF CUTOFF WALL

Dixon Canyon Dam, Plan and Sections



PLAN

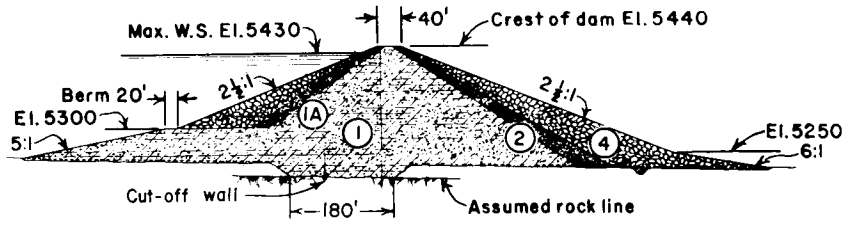
EMBANKMENT EXPLANATION

(1) Impervious material of clay, sand and gravel graduated in coarseness toward outer slopes, compacted in 6" layers.

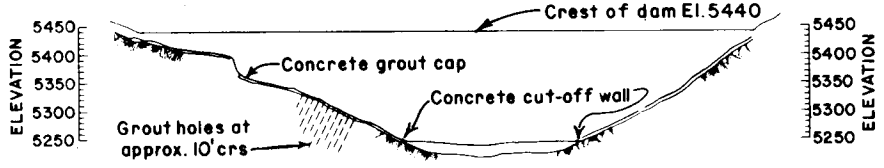
(1A) Semipervious sand and gravel compacted in 12" layers.

(2) Rock fines compacted in 12" layers.

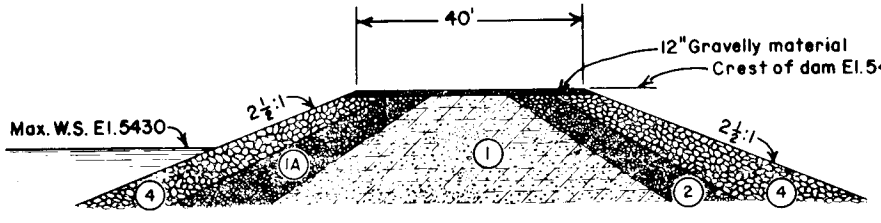
(4) Rockfill graduated in coarseness toward outer slope.



MAXIMUM SECTION

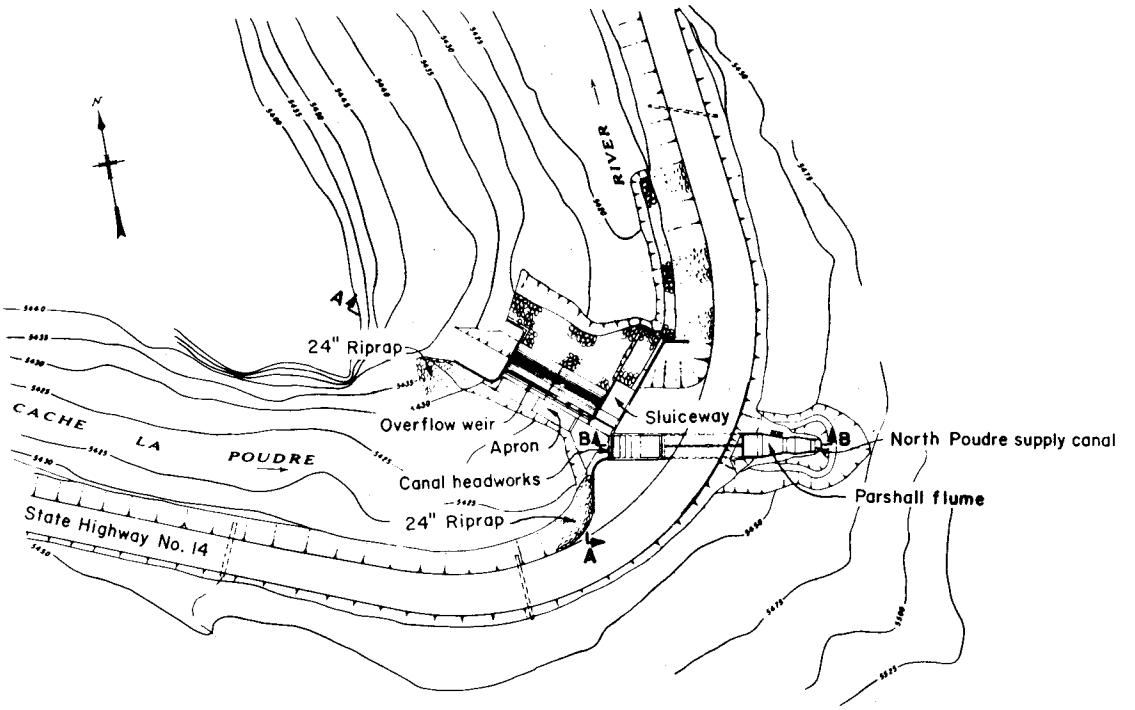


PROFILE ALONG ℄ OF CUT-OFF WALL

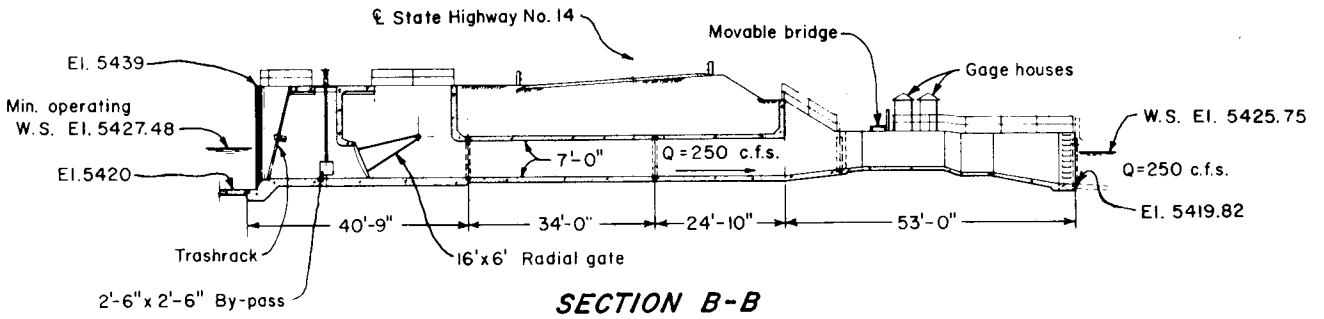


CREST DETAIL

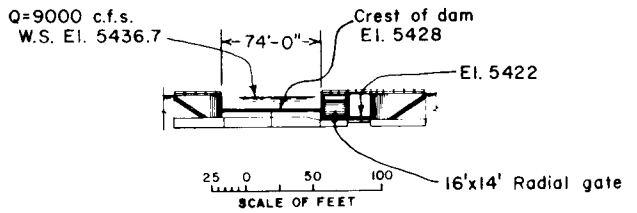
Spring Canyon Dam, Plan and Sections



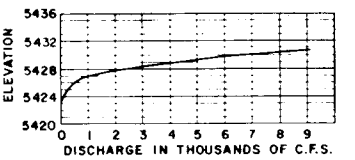
PLAN



SECTION B-B

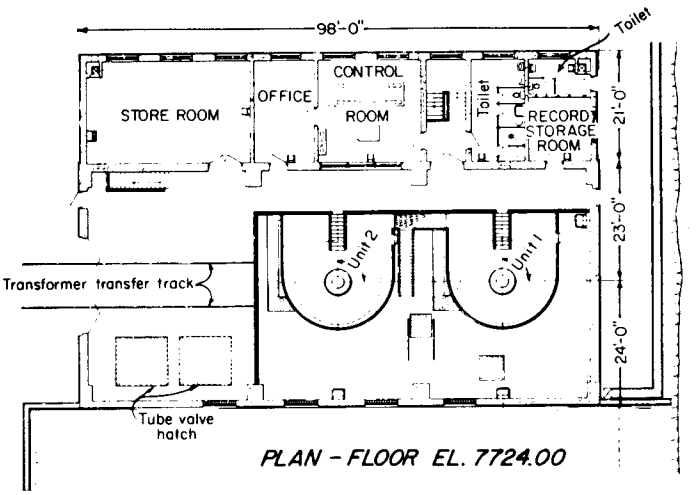


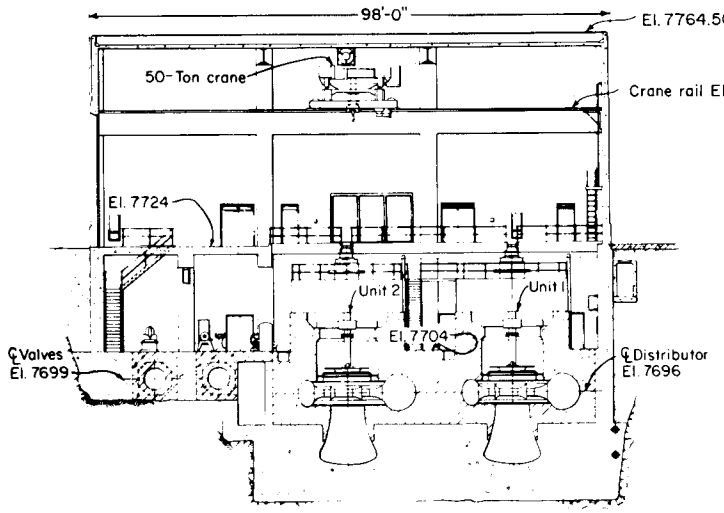
ELEVATION A-A

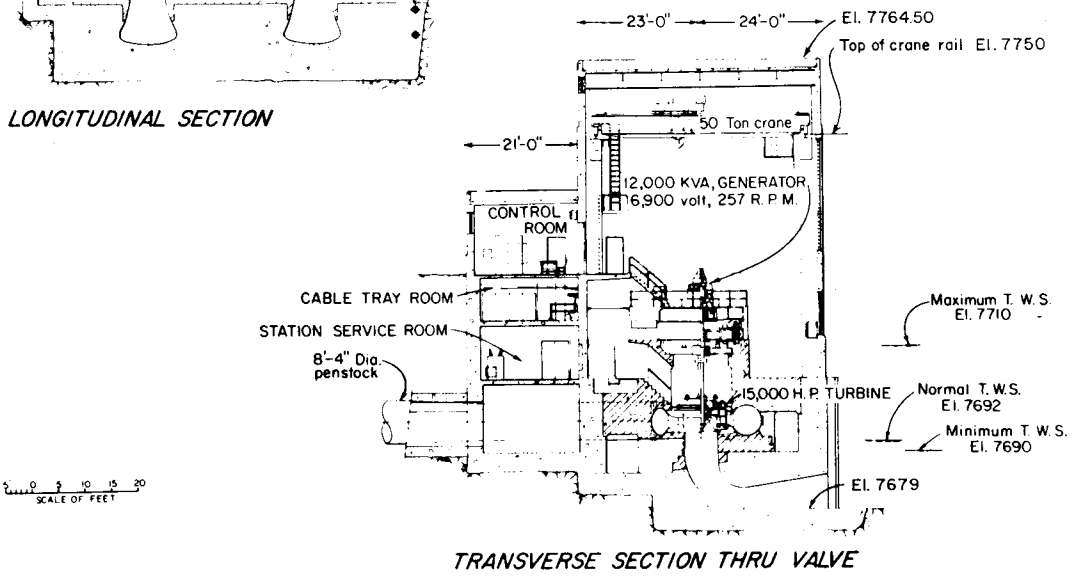


RIVER DISCHARGE CURVE

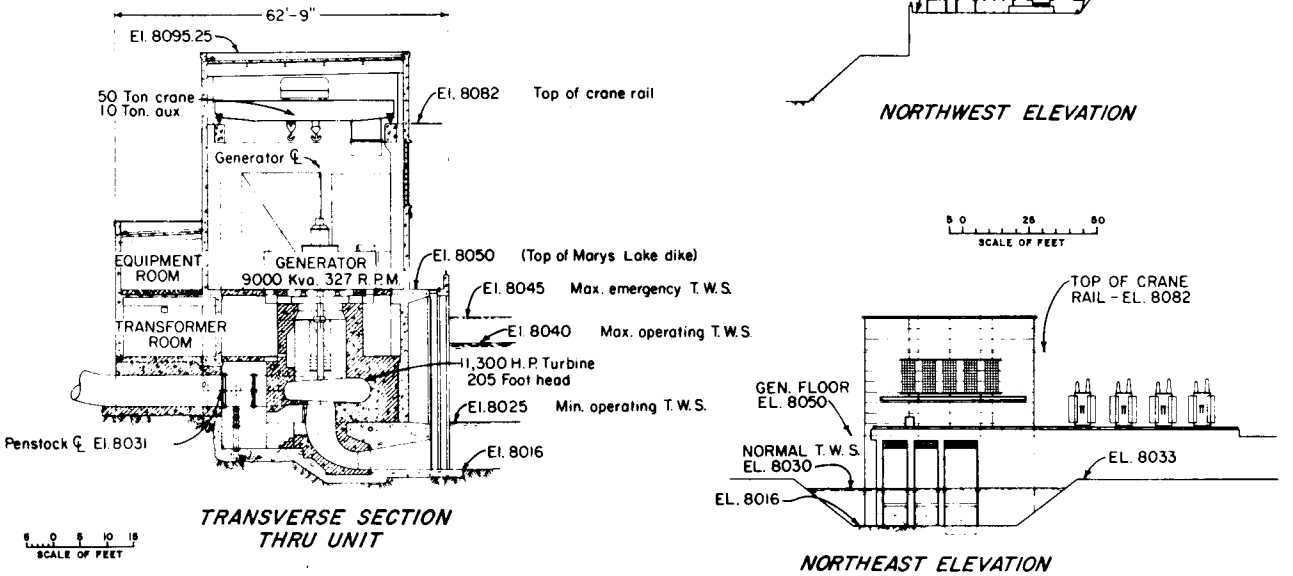
North Poudre Diversion Dam, Plan and Sections

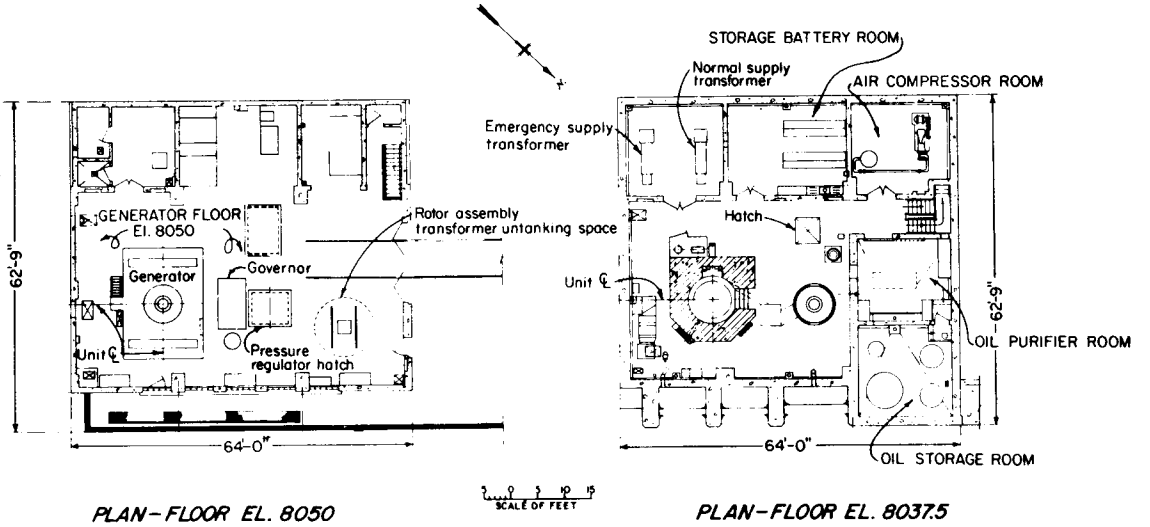




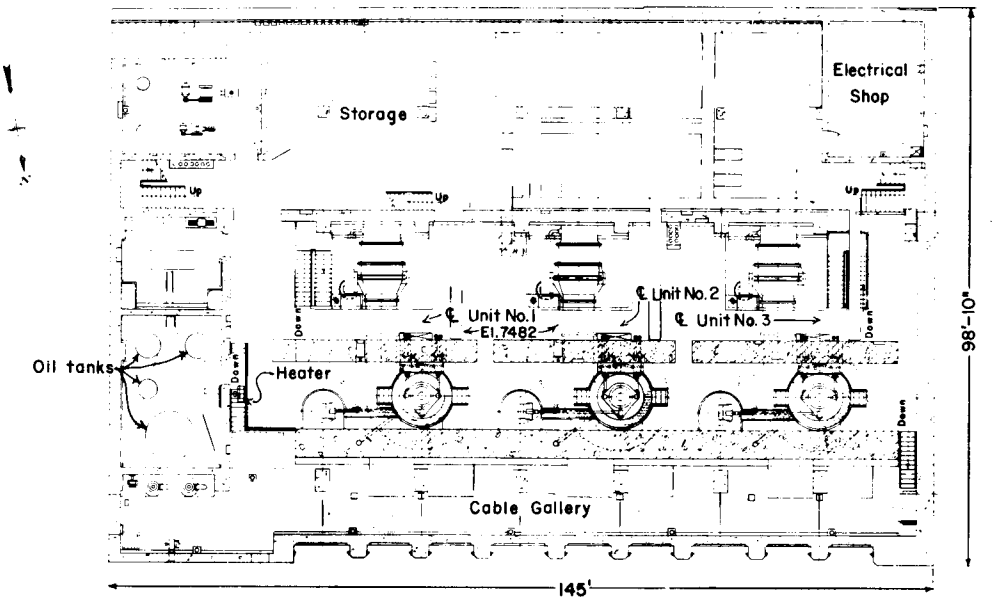


Green Mountain Powerplant, Plan and Sections



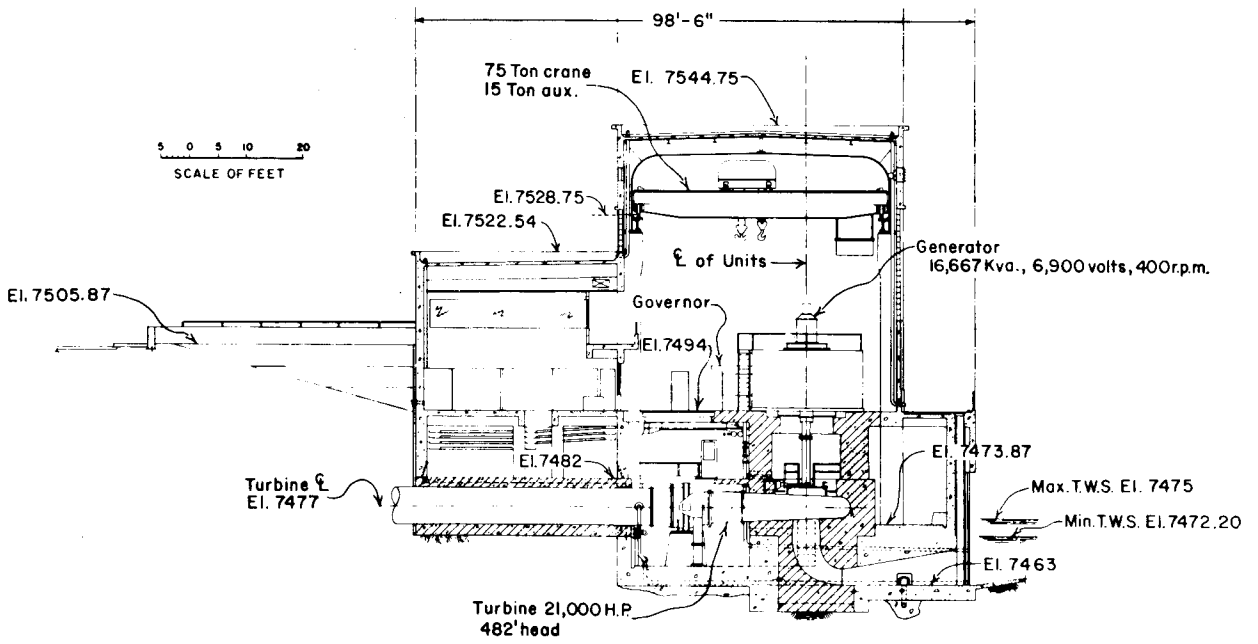


Marys Lake Powerplant, Plan and Sections



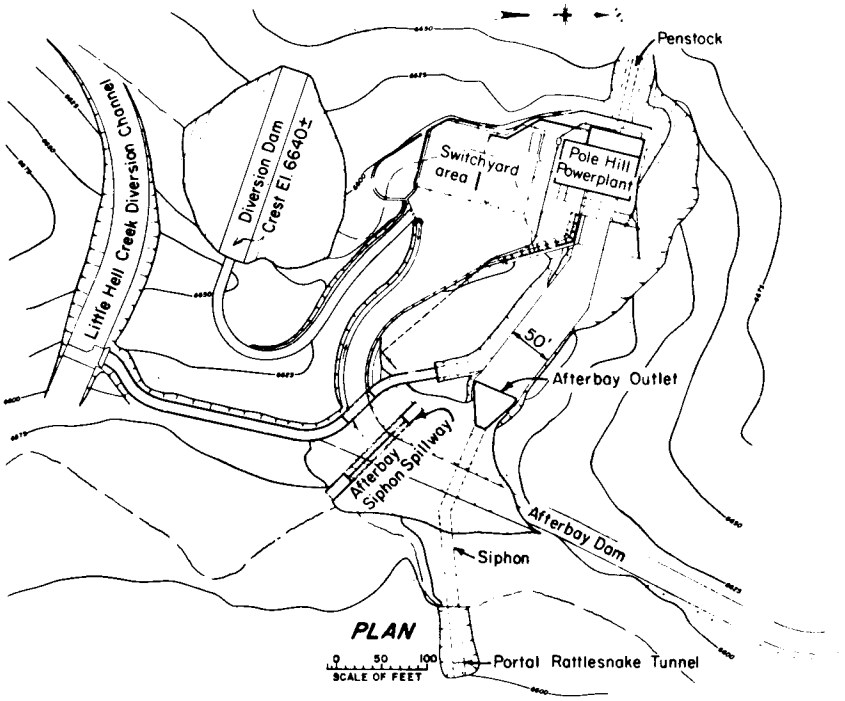
PLAN-FLOOR EL. 7482

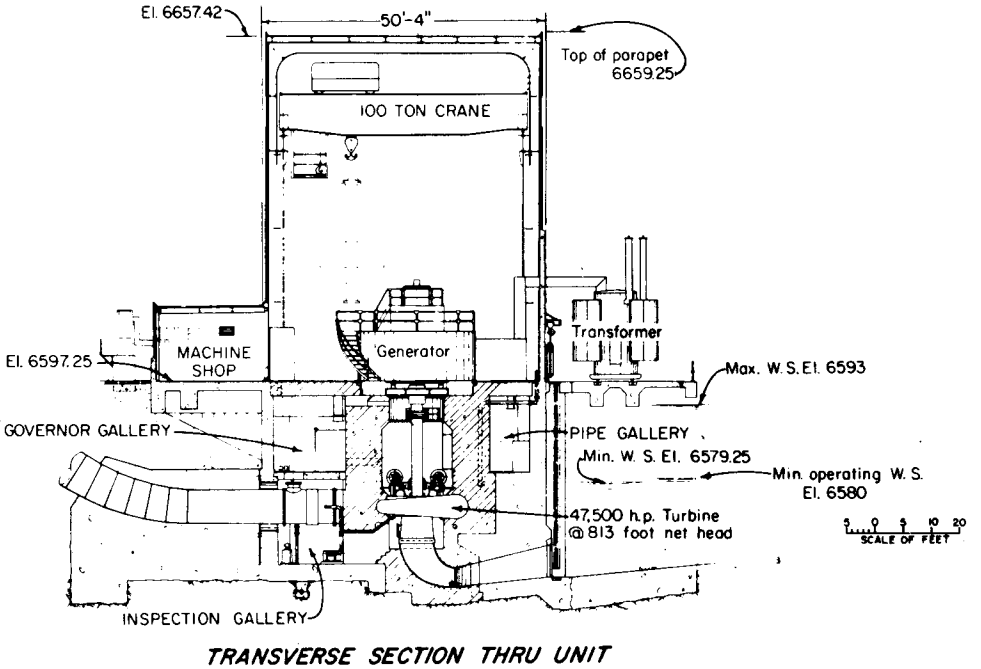
5 0 5 10 20
SCALE OF FEET



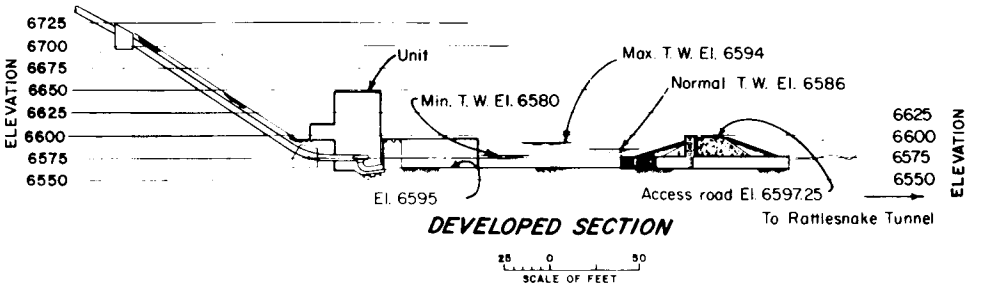
TRANSVERSE SECTION THRU UNIT

Estes Powerplant, Plan and Section



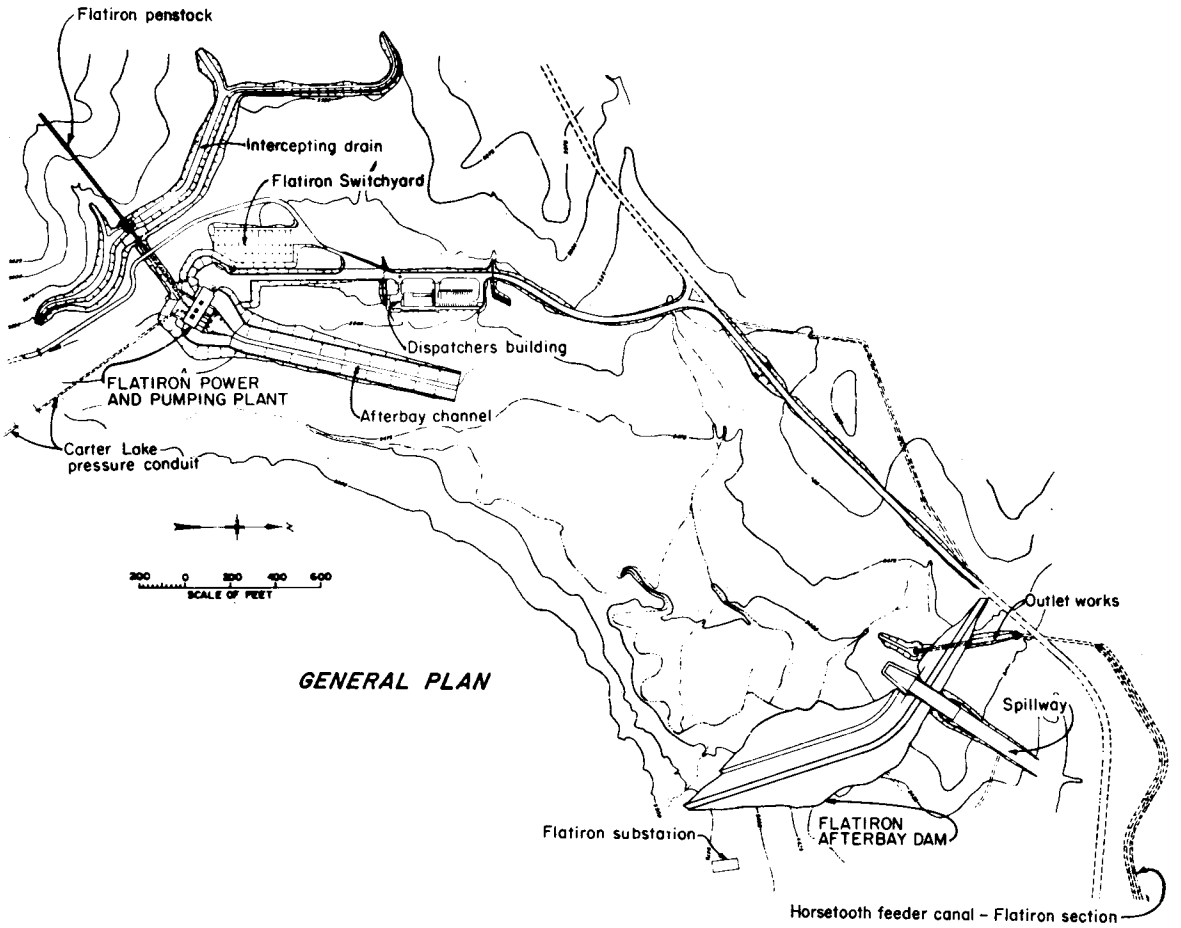


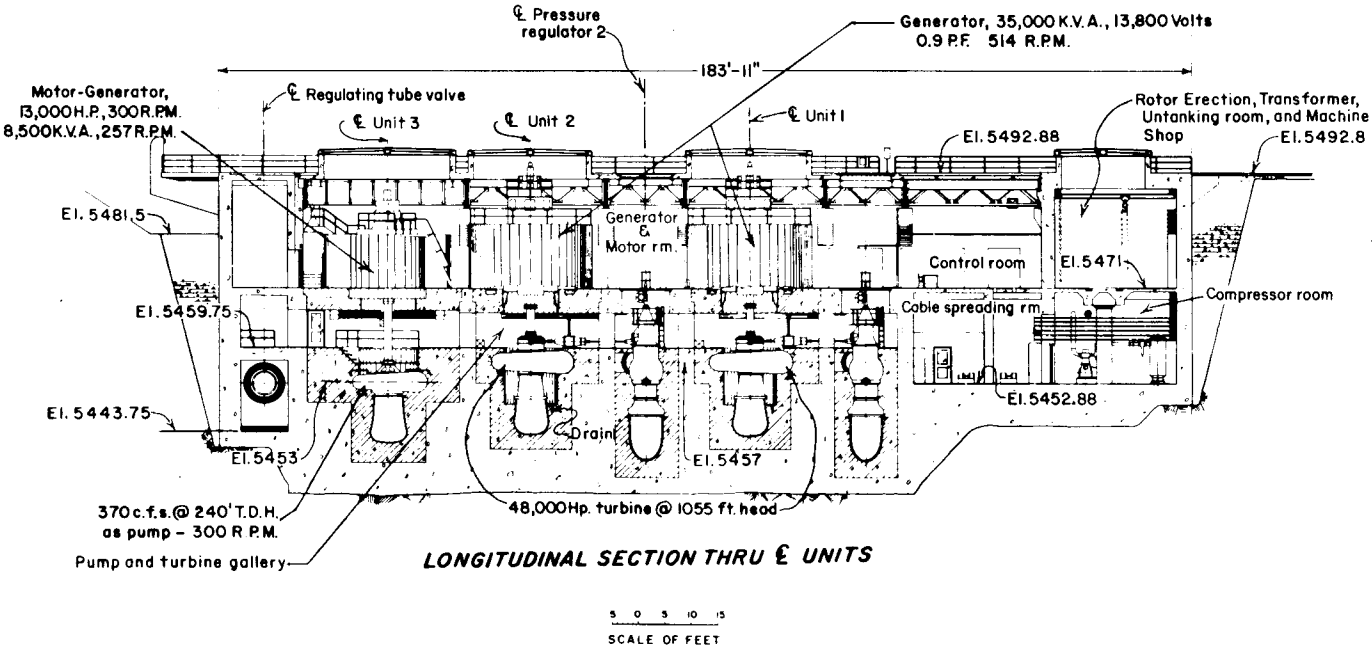
TRANSVERSE SECTION THRU UNIT



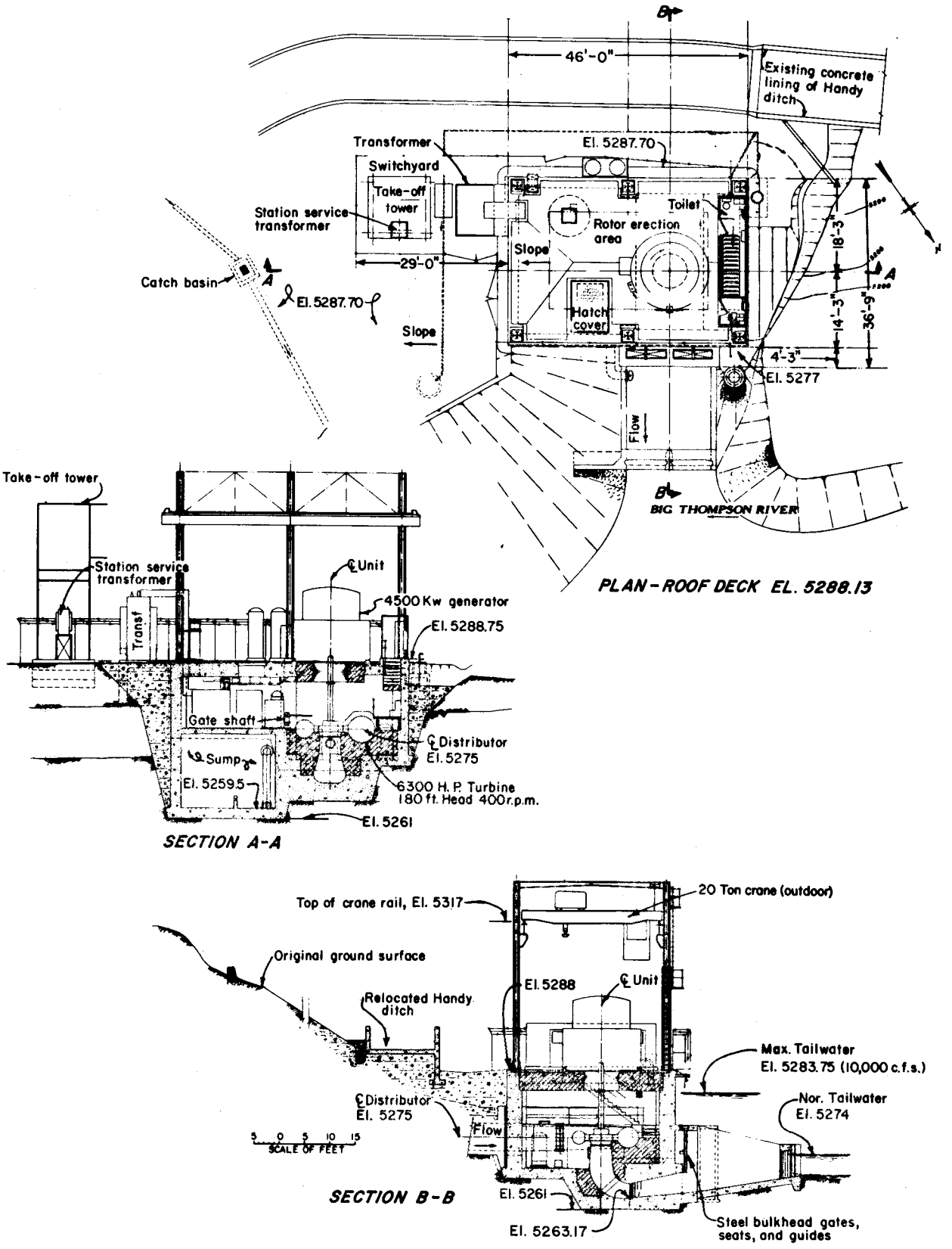
DEVELOPED SECTION

Pole Hill Powerplant, Plan and Sections

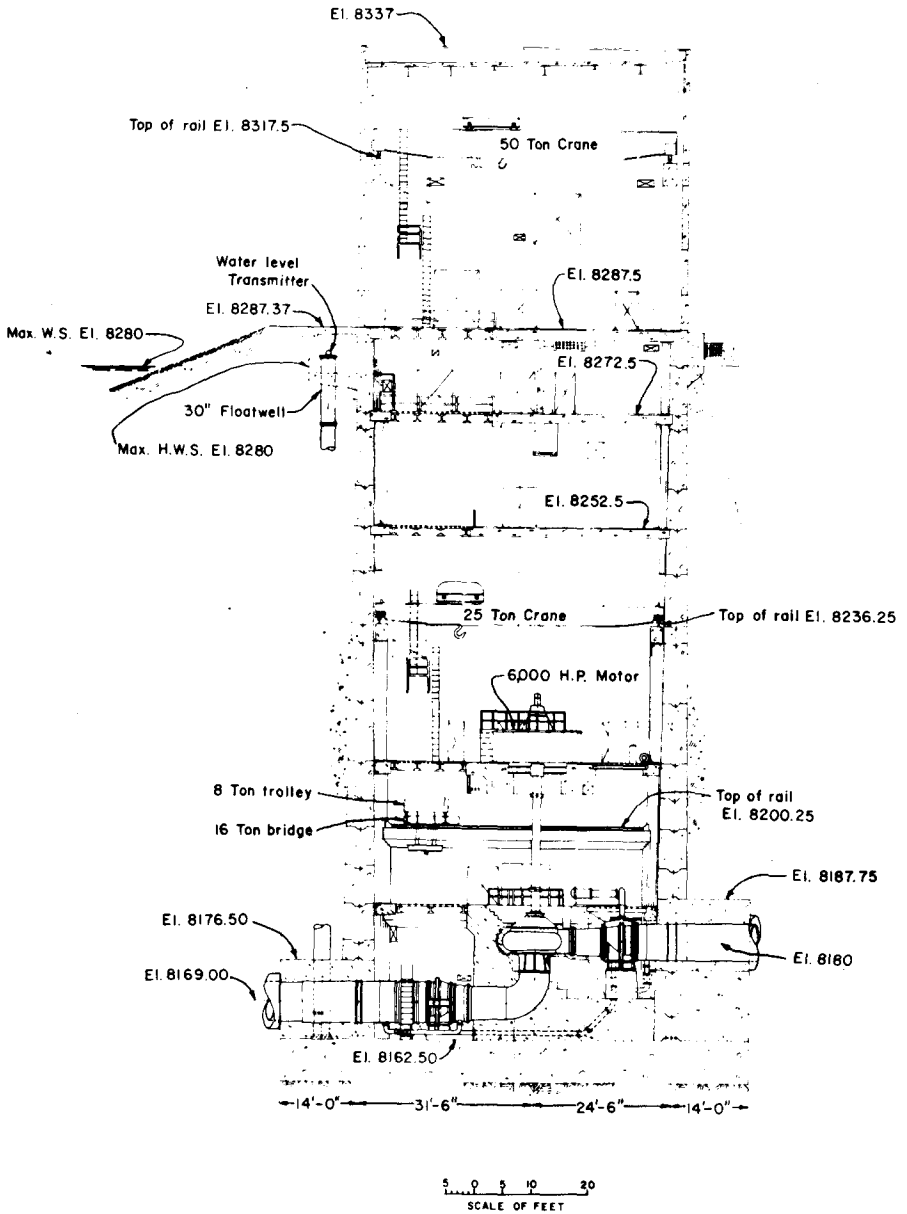




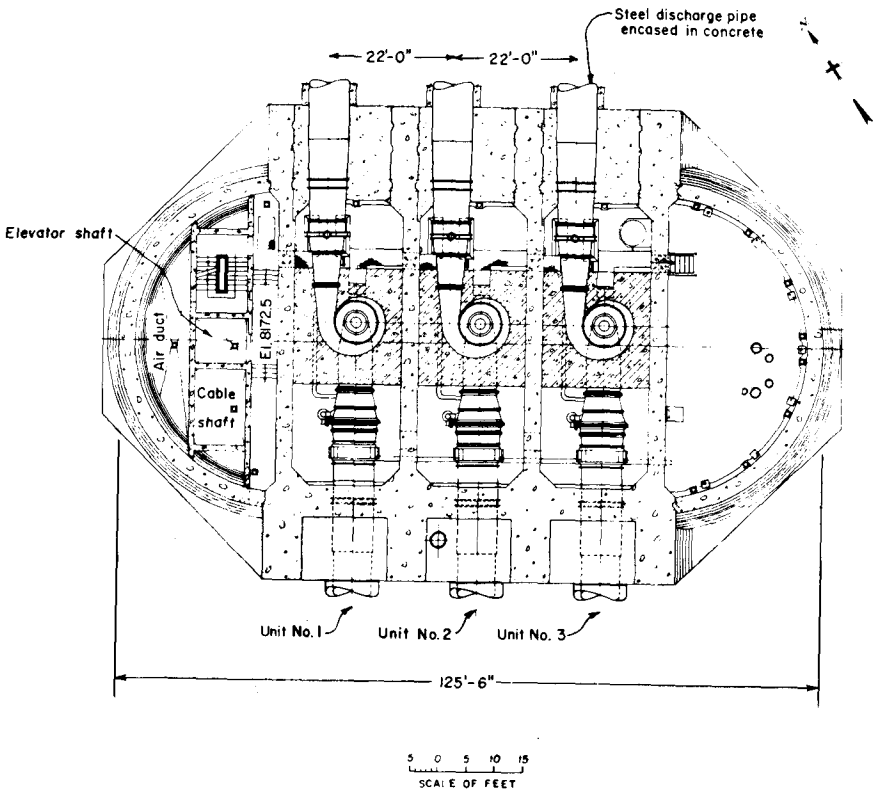
Flatiron Power and Pumping Plant, Plan and Section



Big Thompson Powerplant, Plan and Sections

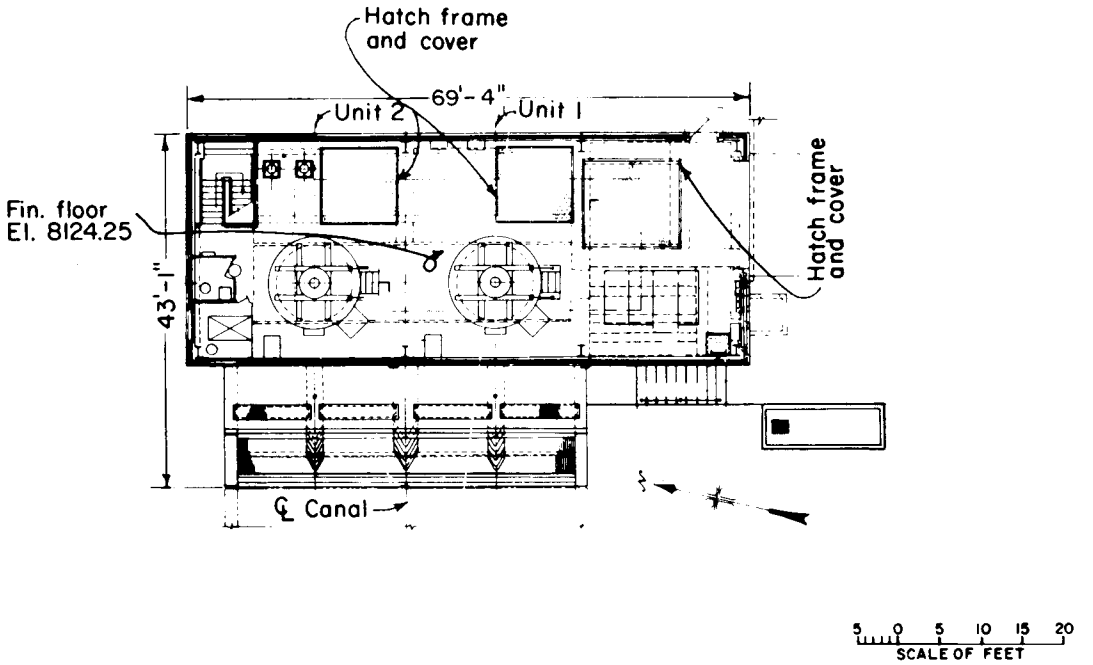


TRANSVERSE SECTION

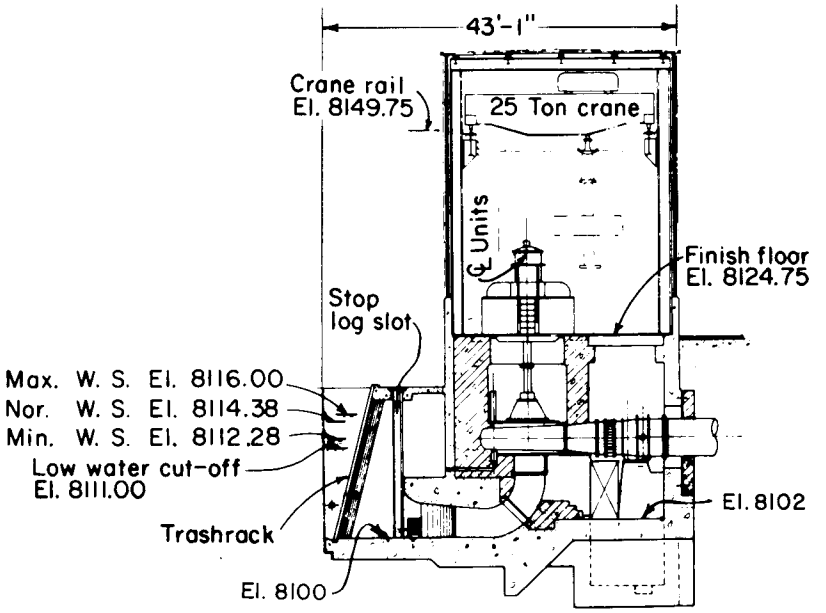


PLAN FLOOR EL. 8180.00

Granby Pumping Plant, Plan and Section



PLAN-MOTOR FLOOR



TRANSVERSE SECTION THRU PUMP

Willow Creek Pumping Plant, Plan and Section